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5728

Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

SEPTEMBER, 1958 VOL. 83 NO. 6

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Indexed in Industrial Arts Index and Engineering Index

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Highlights Sidelights *of the News . . .*

September, 1958

The Attorney General's yearly report on the status of the synthetic rubber industry notes that the two developments in 1957 most significant to competition were the transition to a buyers' market and the entry of a number of new producers into various segments of the industry . . . He also pointed to the almost complete lack of price competition within the industry (page 1008).

Dr. Herman F. Mark, director of the Polymer Research Institute of the Polytechnic Institute of Brooklyn, reports that some of the most advanced forms of synthetic rubber and plastics are being developed by the Soviet Union . . . Dr. Mark recently concluded a tour of Russia during which time he was a guest of the Russian Academy of Sciences (page 1011).

Rubber Research Association of Haifa, Israel, has dedicated a new technical development center at the Israel Institute of Technology known as Technion City . . . The Association, an autonomous body owned and operated by a board of management of the rubber manufacturers of Israel, has played a significant role in the expanding Israeli rubber industry (page 1012).

Some 700 delegates and guests attended the Fifth Postwar Meeting of the German Rubber Society held in Cologne, Germany . . . Five plenary lectures and 32 technical papers were presented during the four-day meeting . . . A number of scientists from the United States were in attendance and participated in the program (page 1016).

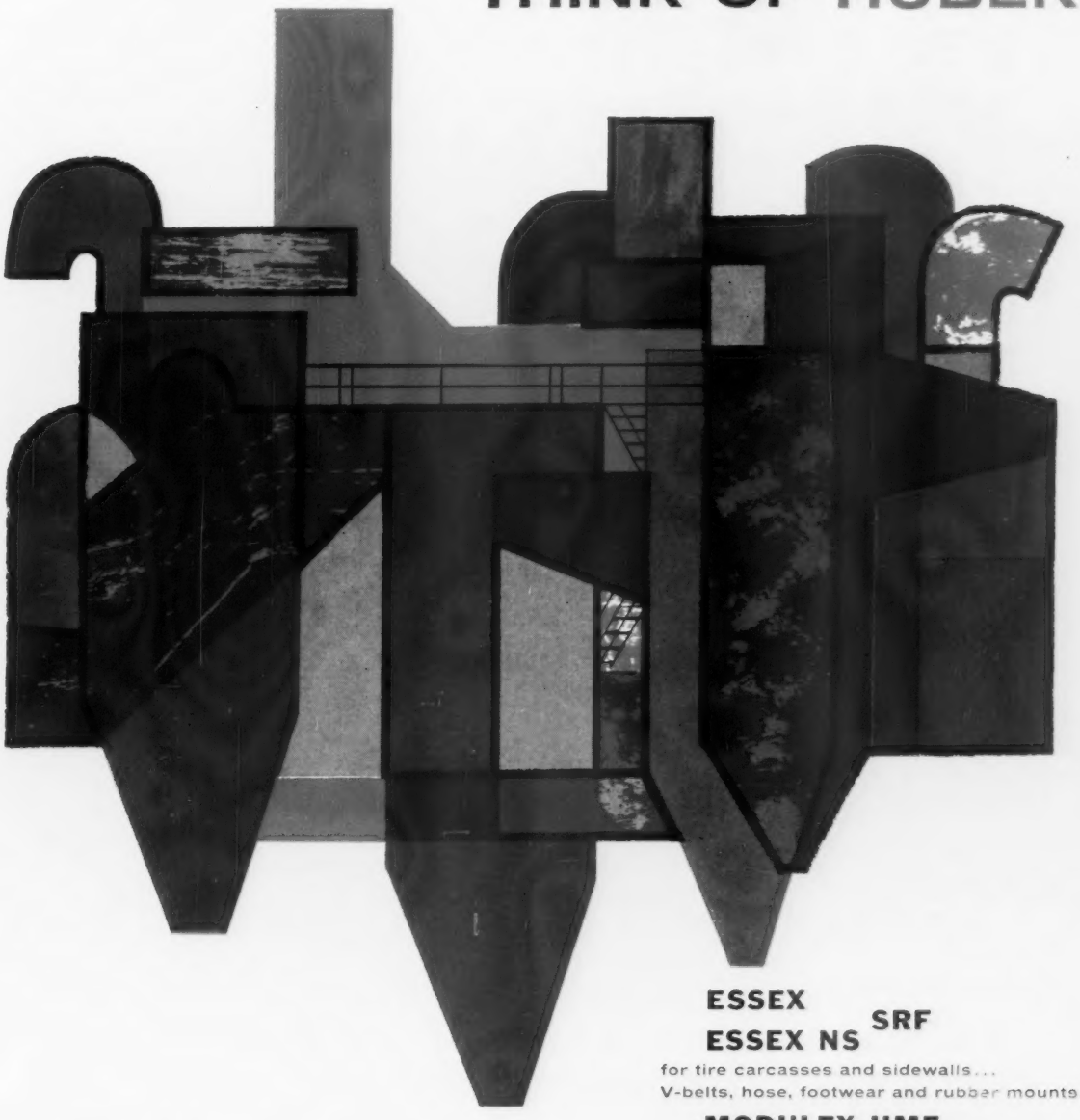
Silicone Products Department of the General Electric Co. has announced the development of a nitrile silicone rubber that is said to combine oil resistance with the ability to maintain strength and usefulness at temperatures ranging from −100 to +500°F. (page 1018).

Plans for the celebration of the 50th Anniversary of the Teaching of Rubber Chemistry at the University of Akron are progressing and six major rubber industry leaders have been named to an Honorary Committee . . . To be held on October 3, the celebration will feature an evening banquet which will be addressed by Dr. Alan Waterman, director of the National Science Foundation (page 1020).

Who is this month's "Man in the News"?
See the special RUBBER AGE feature on page 920.

for rubber reinforcing pigments

THINK OF HUBER



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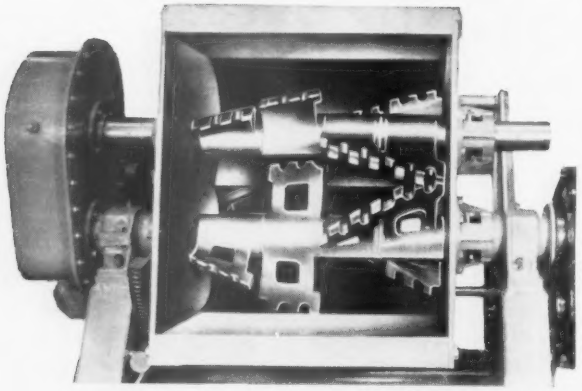

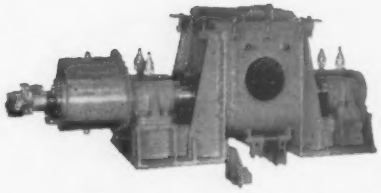

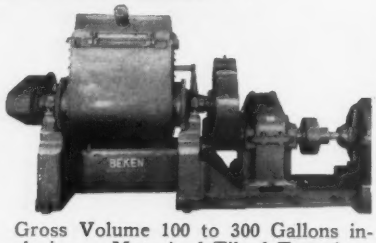

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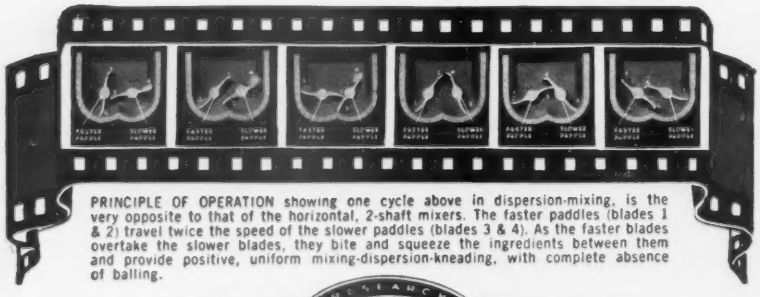

PRINCIPLE OF OPERATION showing one cycle above in dispersion-mixing, is the very opposite to that of the horizontal, 2-shaft mixers. The faster paddles (blades 1 & 2) travel twice the speed of the slower paddles (blades 3 & 4). As the faster blades overtake the slower blades, they bite and squeeze the ingredients between them and provide positive, uniform mixing-dispersion-kneading, with complete absence of balling.

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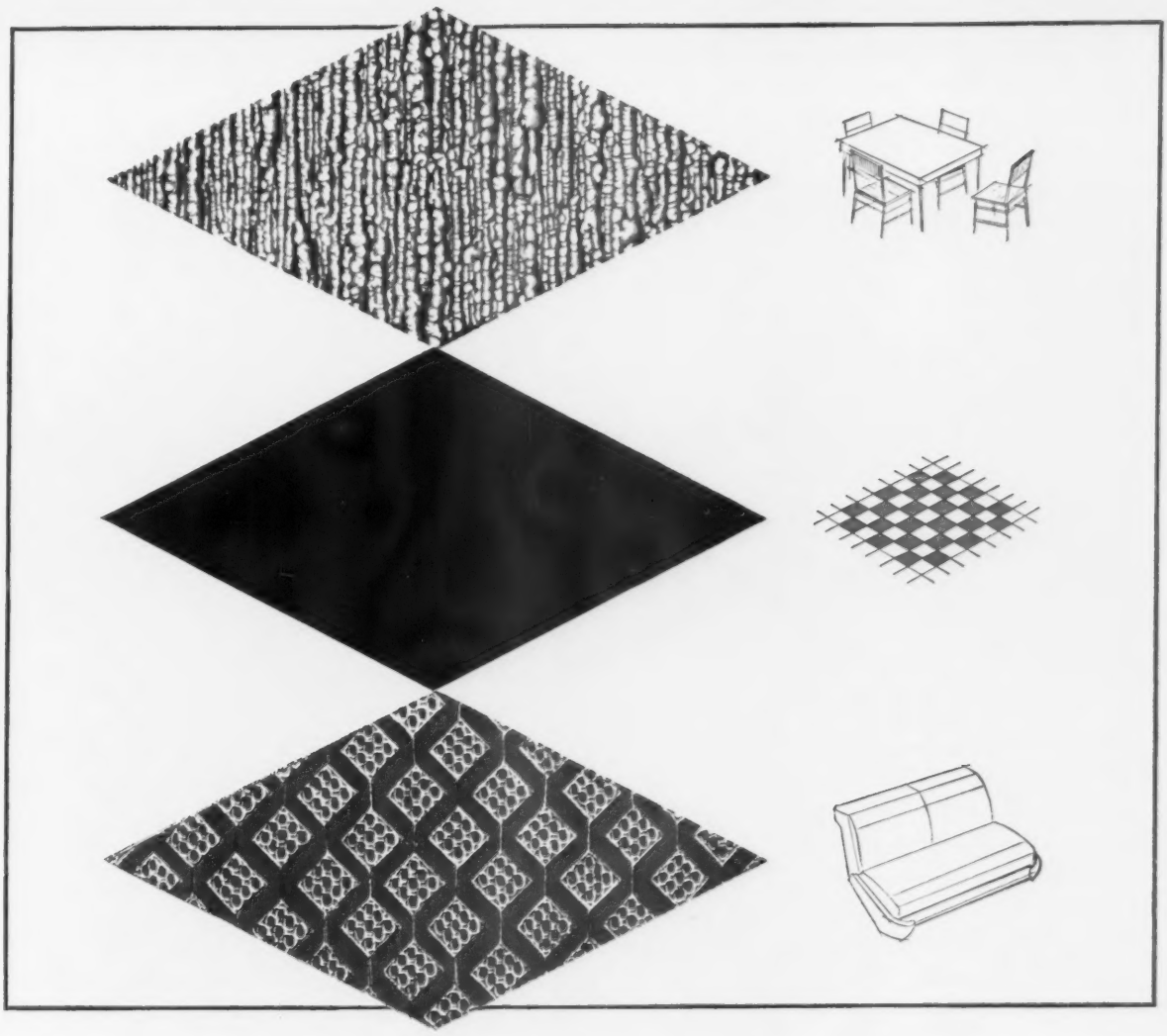
Man in the News

Henry F. Palmer

► Well-known to the rubber industry, Dr. Henry F. Palmer has been appointed technical director of the Kirkhill Rubber Co., Brea, Calif. Dr. Palmer, who has been a consultant in rubber technology for the past four years, entered the rubber industry in 1925 as a research chemist for the Firestone Tire & Rubber Co. From 1926 until 1942, Dr. Palmer was chief chemist for the Xylos Rubber Division of Firestone and then was named chief chemist of the parent company. He spent two years during World War II on loan to the Rubber Reserve Co. as production manager of the government's Synthetic Rubber Plants.

After the war, Dr. Palmer returned to Firestone to assume the position of assistant director of Chemical Laboratories. In 1946, he struck out on his own and went into private practice as a consultant in rubber technology. However, in 1950, he left the consulting firm to accept the position of general manager of the Kentucky Synthetic Rubber Corp. in Louisville, Ky. This was the organization set up by eleven companies to operate Plancor 1278, a government-owned synthetic rubber plant. He subsequently was appointed vice-president of Kentucky Synthetic in 1953. Later that year, Dr. Palmer moved to U. S. Rubber Reclaiming Co., Inc., in Buffalo, N. Y., as vice-president in charge of sales and research. In 1954, he resumed private practice as a rubber technology consultant and was working in that field when the position with Kirkhill Rubber presented itself.

Dr. Palmer received an A.B. degree from Dartmouth College in 1921 where he was a chemistry major and the recipient of the Atherton Greek Prize in his sophomore year, 1918. His thesis on "Control of Isomer Formation" was presented in 1922 when he received an M.A. in industrial chemistry from Ohio State University. In 1925, he received a Ph.D. from Ohio State in physical and industrial chemistry. While working on his Ph.D., Dr. Palmer



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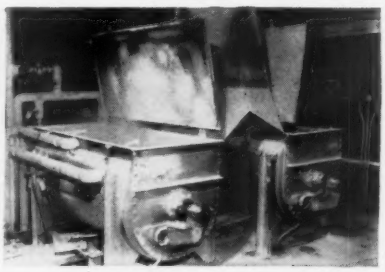

Photo shows two of many Day Blenders being used at the Goodyear Tire & Rubber Co. for mixing a variety of compounds.

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was awarded a University Scholarship in 1924 and won a Graselli Fellowship in 1925. He was a chemistry instructor at both Dartmouth and Ohio State while he was completing his graduate work. In 1938, he was awarded a Ch.E., a professional degree, from Ohio State.

Dr. Palmer maintains an active affiliation with many scientific and professional societies and organizations, and has served in an official capacity with some of the organizations. He was chairman of the Akron Section of the American Chemical Society in 1928 and was director of the Rubber Division of A.C.S. from 1950 to 1952. He held administrative positions with the Akron Rubber Group from 1946 until 1950 and has been an officer of the Akron District, Society of Professional Engineers, and the Ohio Society of Professional Engineers. His other affiliations include the American Institute of Chemical Engineers, the American Institute of Chemists, the American Institute of Management, Alpha Chi Sigma, Gamma Alpha, Phi Lambda Upsilon, and Sigma Xi.

Over the years, Dr. Palmer has had a hand in the publication and development of about 30 articles and patents on a variety of subjects. Almost incongruously, before Dr. Palmer accepted the position with Kirkhill, he was urged by several personal agencies to join them in an executive capacity. Dr. Palmer reflected on his 33 years of service to the rubber industry and replied that he could not honestly accept their proposition. Dedicated to the ideals of singleness of purpose and devotion to duty, Dr. Palmer is a credit to the creative end of the rubber industry. His career, that has spanned a generation of accomplishment, can serve as a goal to every member of the rubber society.

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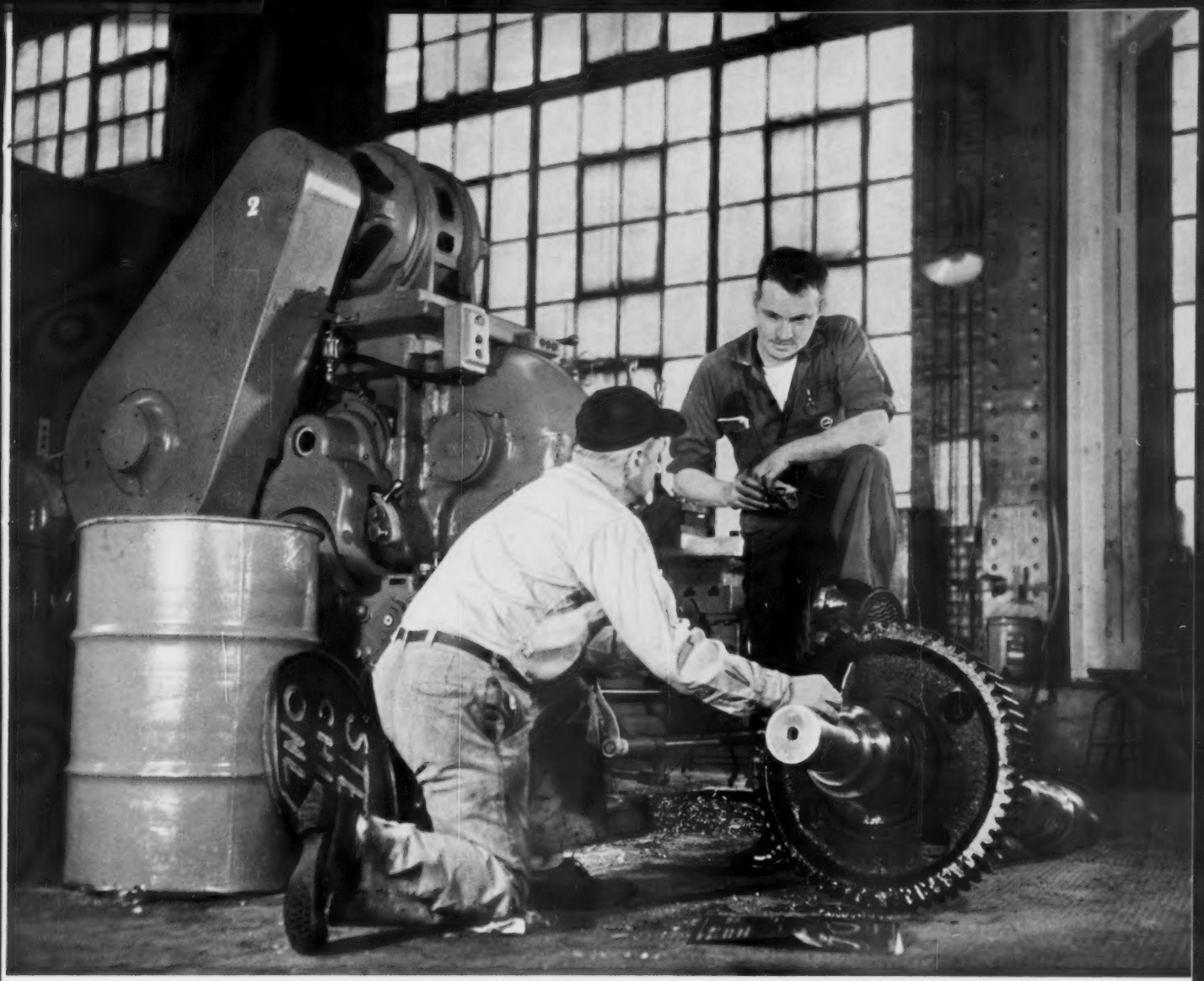

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GOODYEAR

CHEMICAL DIVISION

Chemigum, Plioflex—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Photo courtesy Wilson Sporting Goods Co., Chicago, Illinois, and Haartz-Mason, Inc., Watertown, Mass.

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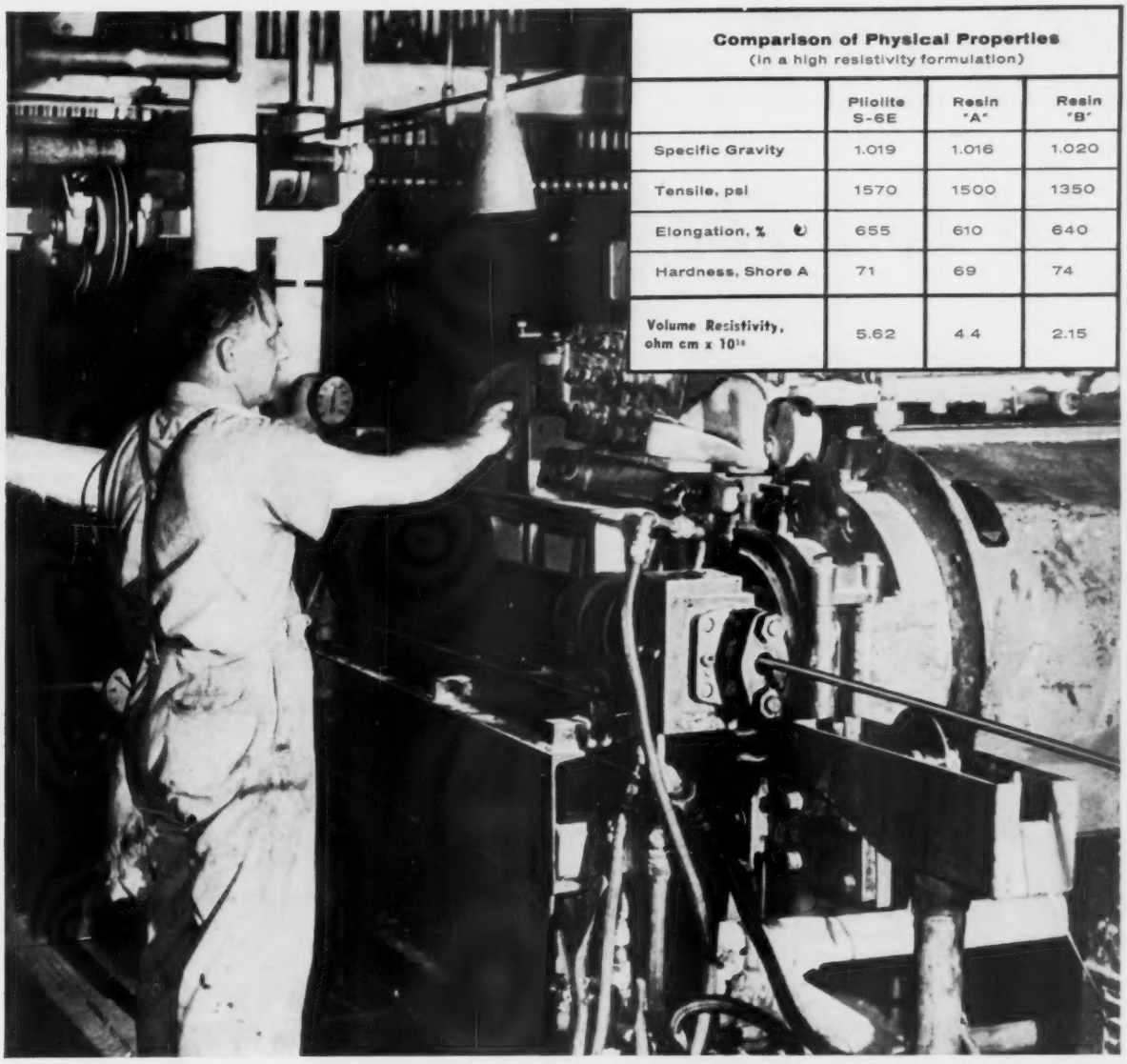

Comparison of Physical Properties
(in a high resistivity formulation)

	Pliolite S-6E	Resin "A"	Resin "B"
Specific Gravity	1.019	1.016	1.020
Tensile, psi	1570	1500	1350
Elongation, %	655	610	640
Hardness, Shore A	71	69	74
Volume Resistivity, ohm cm x 10^{16}	5.62	4.4	2.15

Photo courtesy, The Okonite Company, Passaic, New Jersey

New way to meet tight wire "specs"—with ease!

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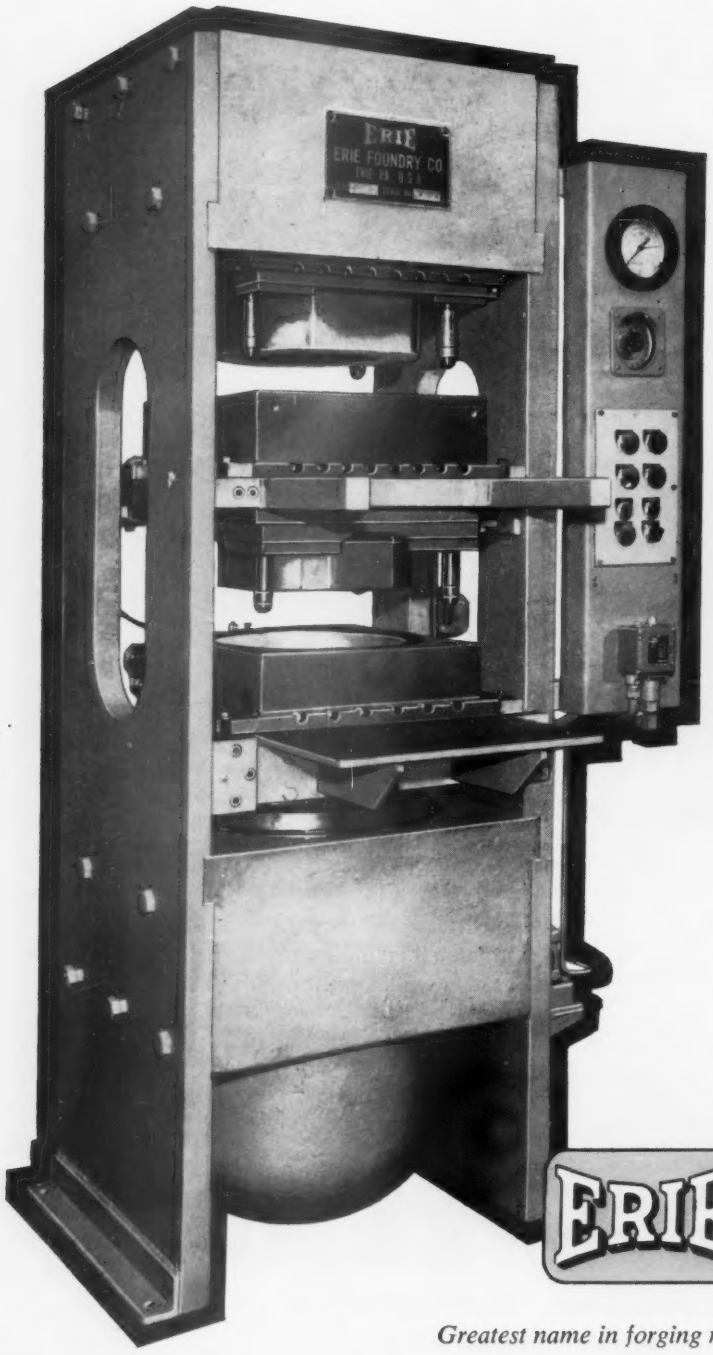
GOODYEAR

60½ GOODYEAR ANNIVERSARY

CHEMICAL DIVISION

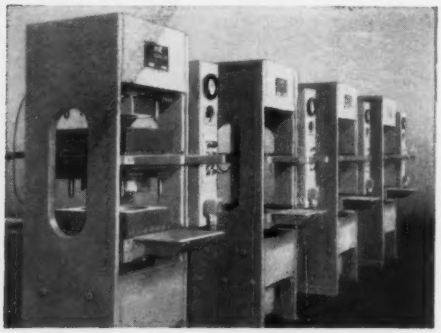
Pliolite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

this ERIE press "stands out" for low-cost molding



If you're molding plastics or thermo-setting materials, you can boost profits by including Erie presses like these in your operation. Of side plate construction, with two 15" openings, this machine is up-acting, has a 14" main ram with a 16" stroke.

Semi-automatic in operation, this Erie press features a die-slide arrangement and accurate action that holds scrap loss to absolute minimums. Low maintenance costs and overall savings in operation make these presses ideal for any compression molding operation.



The battery of presses shown above is employed in a precision plastics operation (the owner commented, incidentally, that they are "performing better than the manufacturer stated"). This battery is powered by a high and low pressure accumulator system which was built by Erie Foundry. The presses are available with self-contained pumping units.

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COMING EVENTS

Sept. 19. American Society for Quality Control, San Francisco Bay Area Quality Control Conference, Stanford, Calif.

Sept. 25. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Oct. 3. Detroit Rubber & Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 7. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Oct. 9. Southern Ohio Rubber Group, Fall Technical Meeting, Gibbons Hotel, Dayton, Ohio.

Oct. 14. Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.

Oct. 16. Boston Rubber Group, Fall Meeting, Hotel Somerset, Boston, Mass.

Oct. 17. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 17-18. Southern Rubber Group, Roosevelt Hotel, New Orleans, La.

Oct. 24. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Oct. 24. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Nov. 4. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Nov. 6. Rhode Island Rubber Club.

Nov. 13. Northern California Rubber Group.

Nov. 14. Chicago Rubber Group.

Nov. 14. Connecticut Rubber Group.

Nov. 14. Philadelphia Rubber Group, Fall Dance, Manufacturers Golf and Country Club, Oreland, Penna.

Nov. 17-21. Society of the Plastics Industry Annual National Conference, Morrison Hotel, Chicago, Ill.

Nov. 30-Dec. 5. A.S.M.E. Annual Meeting, Hotel Statler, New York, N. Y.

Dec. 2. Buffalo Rubber Group, Xmas Party.

Dec. 2-4. Seventh Annual Wire and Cable Symposium, Berkeley-Carteret Hotel, Asbury Park, N. J.

Dec. 4. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 5. Detroit Rubber & Plastics Group, Xmas Party, Statler-Hilton Hotel, Detroit, Mich.

Dec. 12. New York Rubber Group, Xmas Party.

Dec. 13. Southern Ohio Rubber Group, Winter Meeting, Miami Valley Country Club, Dayton, Ohio.

Jan. 23, 1959. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Jan. 30-31, 1959. Southern Rubber Group, Statler Hotel, Dallas, Texas.

Feb. 12, 1959. Fort Wayne Rubber & Plastics Group, Winter Meeting, Van Orman Hotel, Fort Wayne, Ind.

March 20, 1959. New York Rubber Group, Technical Meeting, Henry Hudson Hotel, New York, N. Y.

April 3, 1959. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

April 16, 1959. Fort Wayne Rubber & Plastics Group, Spring Meeting, Van Orman Hotel, Fort Wayne, Ind.

May 12-15, 1959. Division of Rubber Chemistry, A.C.S., Spring Meeting, Biltmore Hotel, Los Angeles, Calif.

June 4, 1959. New York Rubber Group, Summer Outing.

Aug. 4, 1959. New York Rubber Group, Golf Tournament.

Oct. 16, 1959. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Nov. 9-13, 1959. Joint International Meeting of Division of Rubber Chemistry, A.C.S.; Committee D-11, A.S.T.M., and Rubber and Plastics Division, A.S.M.E., Shoreham Hotel, Washington, D. C.

Dec. 18, 1959. New York Rubber Group, Xmas Party.

May 24-27, 1960. Division of Rubber Chemistry, A.C.S., Spring Meeting, Statler Hotel, Buffalo, N. Y.

Sept. 13-16, 1960. Division of Rubber Chemistry, A.C.S., Fall Meeting, Commodore Hotel, New York, N. Y.

How to Protect Product Quality

High-speed operations in the rubber industry require fast, accurate control of tensions. Improper speed matching can ruin the product in process. To help protect product quality, General Electric has designed a new packaged, adjustable-speed drive—the Speed Variator.

Operating from an a-c power source, the Speed Variator provides accurate control of drive speeds over an infinite range.

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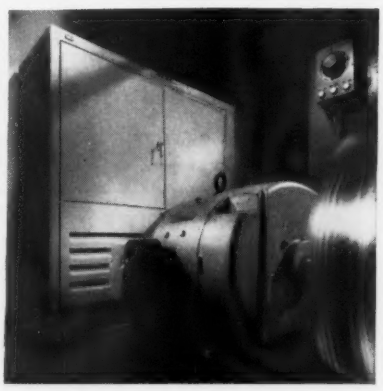

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3. Two-Unit, Four-Bearing M-G Set features Tri-Clad† '55' motor for more dependable performance.

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5. Kinamatic* Drive Motors provide extra power to meet peak loads. For details on this powerful motor see next page.

For more information contact your Apparatus Sales Office or write for GEA-6643. *Direct Current Motor & Generator Department, Erie, Pennsylvania.*

In Canada, contact Canadian General Electric, Peterborough, Ontario.

† *Registered Trade Mark General Electric Co.*
* *Trade-Mark of the General Electric Co.* 813-19

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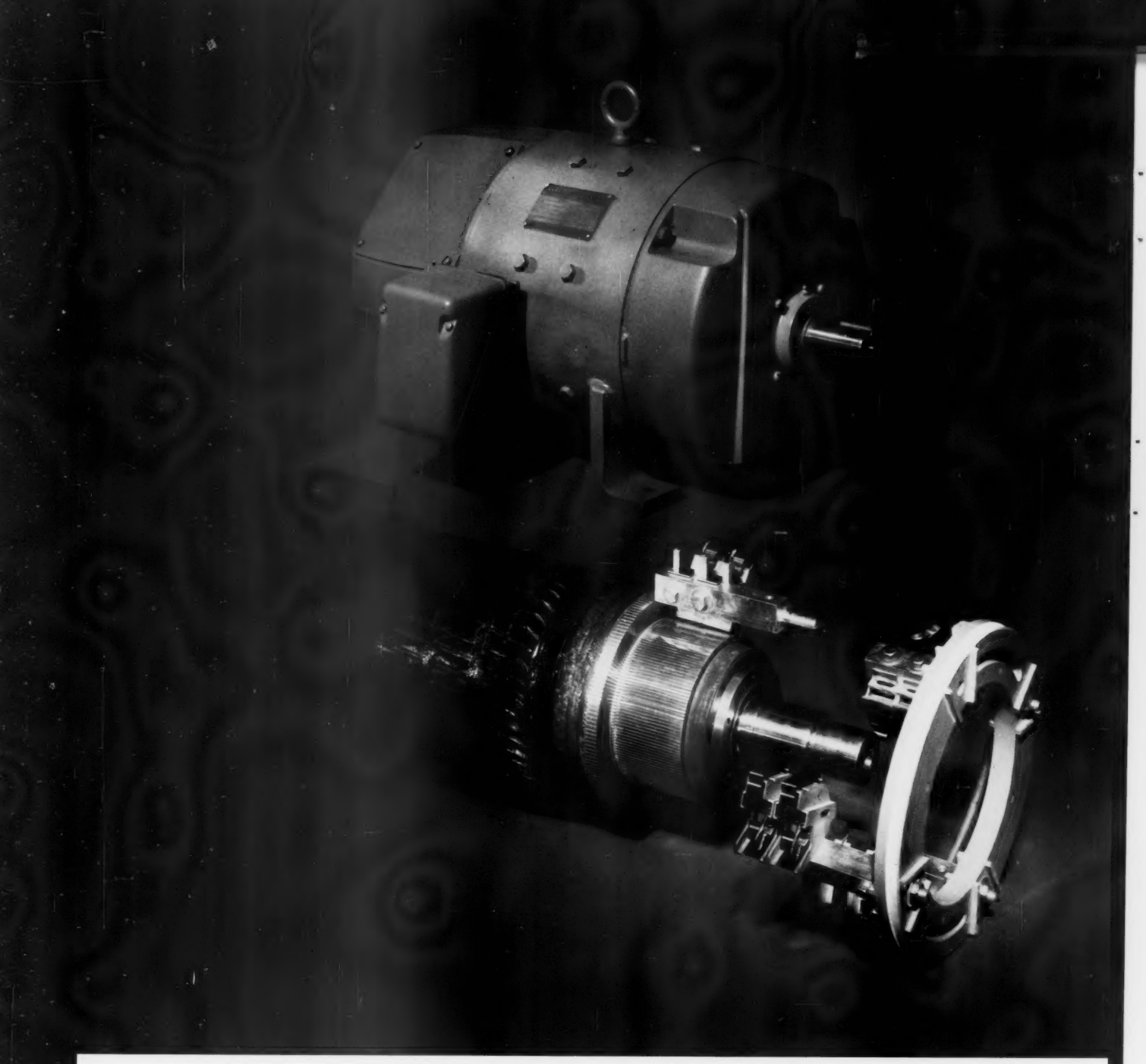
More On Kinamatic Motors



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Extra Power To Meet Peak Loads

KINAMATIC* *. . . a new standard in industrial direct-current motors* . . . designed to meet the vital power load requirements of modern manufacturing methods.

Proper Design Balance . . . means unmatched commutating ability . . . the ability to deliver the short bursts of power required for quick acceleration and deceleration. Fewer turns per armature coil . . . full complement of commutating poles . . . maximum number of commutator segments, combine to permit higher peak loads.

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D-c Kinamatic Motors offer a reliable key to successful automation. Additional information is available at your nearest General Electric Apparatus Sales Office. Or, if you prefer, write for Bulletin GEA-6355, *Direct Current Motor and Generator Department, Erie, Pennsylvania.*

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ESPESOL 165's Narrow boiling range reduces handling time— improves quality of end product!

NEW ESPESOL 165 aliphatic solvent offers rubber processors a *narrow boiling range of 165 to 225 degrees F* with a low-odor factor. This narrow cut with its low end point offers a much shorter drying time and a substantial increase in production. ESPESOL 165's higher initial boiling point offers less evaporation loss and permits greater solvent recovery. The solvent's unusually short distillation range offers two additional benefits: 1. Improved quality of end products. 2. Reduction in amount of solvent used.

Because the use of ESPESOL 165 can reduce handling time, increase production and improve the quality of your end products, this outstanding new solvent deserves the consideration of your organization. Send for the complete ESPESOL 165 story. Brochure containing characteristics and properties yours free on request. (No delivery problems! Eastern maintains adequate stocks of this unique product at all times.)

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LOOK AT THESE FIGURES! PRODUCTION DOWN 7% THIS MONTH AND IT'S ALL YOUR FAULT!!
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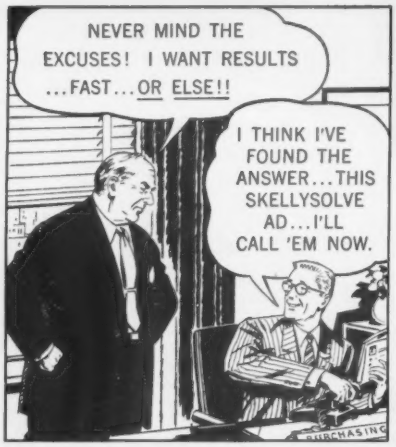
NEVER MIND THE EXCUSES! I WANT RESULTS ...FAST...OR ELSE!!
I THINK I'VE FOUND THE ANSWER...THIS SKELLYSOLVE AD...I'LL CALL 'EM NOW.
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...AND YOU SAY SKELLYSOLVE IS CONSTANTLY CHECKED DURING PRODUCTION AND BEFORE SHIPMENT?
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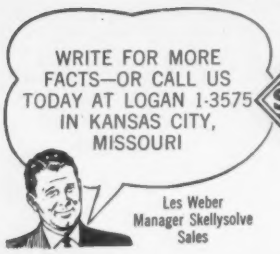
THREE MONTHS LATER
LOOK AT THESE FIGURES!! PRODUCTION UP 9% AND YOU DESERVE FULL CREDIT!! I'M PUTTING YOU DOWN FOR A RAISE!!
GOLLY... THANKS, BOSS!!
SURE GLAD I DISCOVERED SKELLYSOLVE IN TIME!!

When solvents are so important to your business, why take chances on quality or delivery? Next time you order specify Skellysolve.



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SKELLY OIL COMPANY

Industrial Division

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SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor in dried compound. Closed cup flash point about —25°F.

SKELLYSOLVE-C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B. Closed cup flash point about 13°F.

SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-C is desired. Closed cup flash point about —16°F.

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Ask about our new Skelly Petroleum Insoluble Grease.

Increase output . . . reduce rejects . . . lower costs with **HYDRAULIC PRESSES**

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Adamson United Hydraulic Presses are available in a wide range of performance-proved standard designs for the rubber and plastics industries. But when your requirements call for something special—that is when Adamson's extensive experience in press design and engineering can prove most valuable.

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This 2000-ton self-contained transfer molding press is an excellent example of our custom engineering service. Built by Adamson for Orangeburg Manufacturing Company, Inc., this unit is specially designed to produce large molded pipe fittings. Unusually compact, it occupies minimum floor area. Platen size is 54″ x 52″. A unique system of valving and pumping provides exceptional versatility, permits precision control over a broad range of speeds and pressures.

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Why permanently-attached couplings?

Four good answers spell better service... bigger profits!

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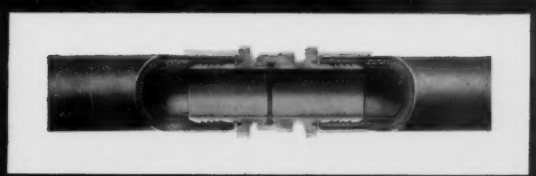
A LEAK-PROOF WITH FULL-FLOW DIAMETER INSIDE. Scovill permanently-attached couplings are made from solid brass forgings and seamless drawn copper tubing to form a strong leak-proof assembly.

For fuel-oil hose . . . permanently-attached couplings by **SCOVILL**



For complete specifications on fuel-oil hose couplings write to Scovill Manufacturing Co., Merchandise Division, 88 Mill St., Waterbury 20, Conn. Ask for Bulletin No. 520-H.

Contact Columbia-Southern for specific information on brand names and availability of any of these quality rubber goods.

HI-SIL®, CALCENE®, & SILENE® MAKE COLORFUL NEWS IN HUES

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Soling to syringes, swim fins to spatulas, stoppers to stair treads—and from smoked sheet to silicone—a rainbow of products for bright and dependable service rises from Columbia-Southern white reinforcing pigments.

Hi-Sil, Calcene and Silene are the quality materials helping to make possible the top-grade, spectrum-spanning articles you see above. Subtle pastels, vivid brights, true deep tones . . . they're all obtainable, along with excellent physicals, in goods of every description to meet modern consumer and industrial needs.

Why not re-examine your own product line? Perhaps a brand-identifying color will materially help your sales appeal and profit picture. If you've already gone to color, perhaps some upgrading with these Columbia-Southern pigments is in order. For particular and individual formulation help, just address us at Pittsburgh or the nearest of our fourteen District Sales Offices.

The Columbia-Southern Chemical Corporation, One Gateway Center, Pittsburgh 22, Pennsylvania. Offices in principal cities. In Canada: Standard Chemical Limited.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

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The strength and SHAPE

of Firestone auto hoses comes from Fortisan-36

Firestone uses Fortisan-36 to shape 21 different radiator hoses. This remarkable reinforcement yarn lets you form and cure hose *easily* to any shape you want.

Fortisan-36's high tensile strength and stability mean better performance at less weight. You get longer life and greater flexibility. Ask Firestone—see how Fortisan-36 rayon takes the woes out of hose.

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Fortisan-36 . . . a Celanese industrial fiber

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UOP 88® and 288® rubber antiozonants compounded for external application provide ready solution to the costly problem of ozone cracking.

Weather-checking of heavy equipment tires during storage is fast becoming a thing of the past. Even where UOP 88 or 288 have not been included in the original formulation, these well-known antiozonants can still do a highly effective job through *external* application—just dip or paint!

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- POWERFUL PROTECTION—sidewalls protected against checking through most rigorous weather conditions.
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- COST INSIGNIFICANT—best ozone protection in storage at minimum cost.
- VERSATILE APPLICATION—now tires can be treated in storage or on the wheel.
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- DIP or PAINT—whichever is most convenient for you.
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- NO UNUSUAL HANDLING procedures—UOP 88 and 288 are conveniently packaged for storage and use.

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Write for detailed information and samples for testing. Our field treating engineers are available to work with you in determining the correct antiozonant.

Taylor-Emmett Timer insures

REPEATABILITY OF CYCLES

Type E364 ROBOTRON* Timer—a flexible, quickly set controller for the precise operation of a Hydraulic Press where bumping and timing control is required. Extremely low load and high capacity insure long life and dependability.

CHECK THESE FEATURES:
Completely Packaged Unit • Airtight Enclosure • Rapid Setup • Cycles Quickly Changed • Extended Rangeability • Enclosed Electrical Component • Plug-in Elements • Etched Circuits

Taylor-Emmett **NEV-R-GRIND*** *Valves mean* **NO WARPING...NO FOULING**

Three-Way (E380) and Two-Way (E370) Valves are fully balanced, cylinder operated, compact and have excellent capacity. Available in 3500 and 6000 psi. body ratings. Both are normally operated at 35 to 50 psi. air pressure.
Fully balanced design permits application of pressure to any port connection. Type E370 is available either normally open, or normally closed. Sizes 1″ to 4″.

Type D532 Cylinder-Operated Valve is half the size of conventional valves, has one quarter the parts. Extremely compact and maintenance-free. 750 psi. Sizes ½″ to 2½″. Normally open: normally closed: 3-way semi-balanced.

Call your Taylor Field Engineer, or write Taylor-Emmett Controls, Inc., Akron, Ohio, or Taylor Instrument Companies, Rochester, New York.

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Taylor-Emmett Controls, Inc.
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Shop Talk . . . . .

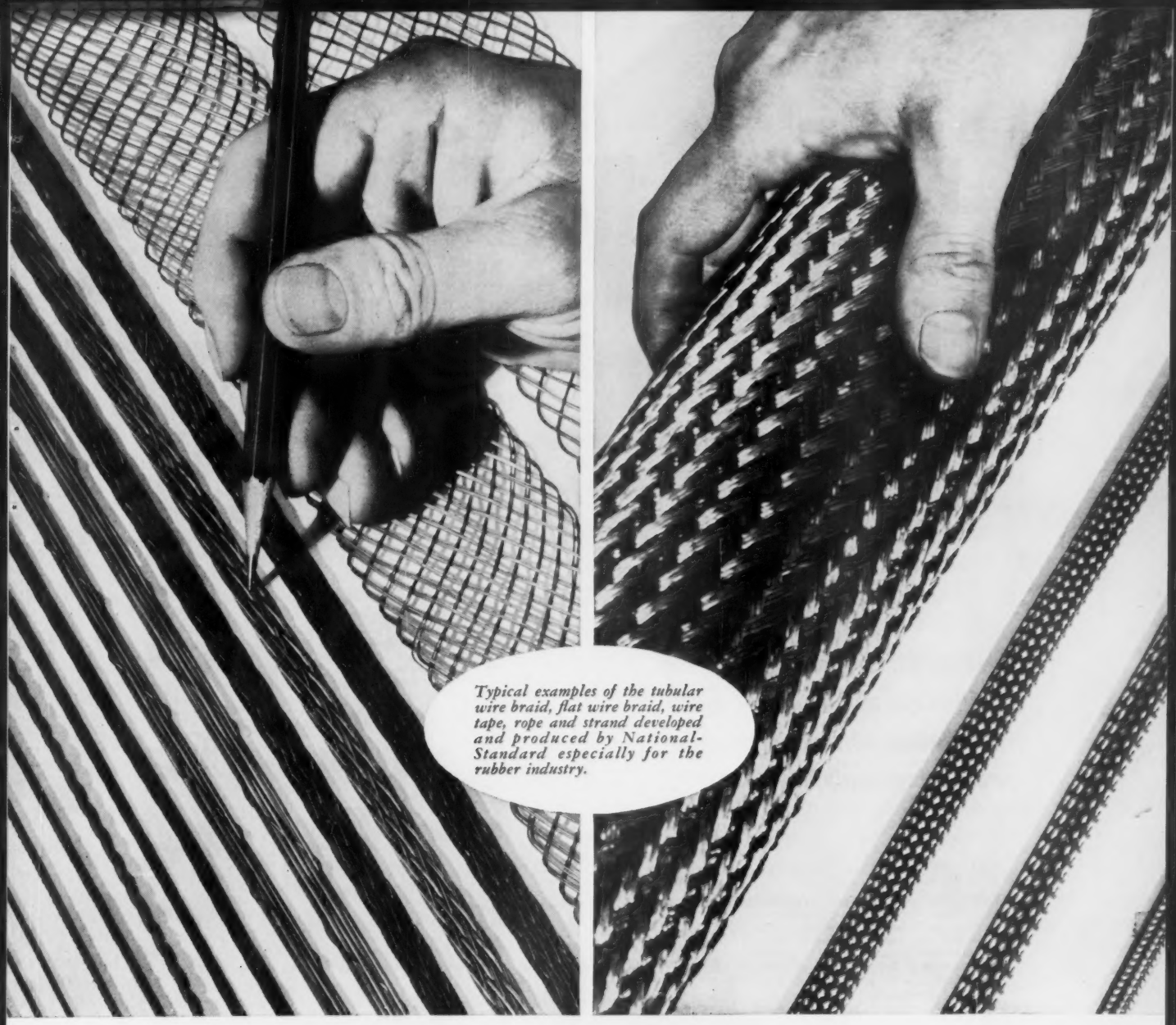
► Several interesting problems were presented to us within the past several weeks by foreign visitors to our offices. One may not make any firm judgment on these matters, but it seems to us there is a growing interest in the manufacture of latex products abroad, particularly in South America. Our visitors tell us of the pending organization of latex glove, balloon and cast product facilities.

Most of our visitors who express an interest in this subject intend to use both natural and synthetic latices in the projected facilities. The companies, for the most part, will not only meet the domestic demand, but also intend to ship to neighboring countries.

► On the domestic front, the last few months have seen the organization of several new rubber companies specializing in component parts for aircraft and missile manufacturers. Though small in relative size, these companies were organized to produce the highly critical parts which go into modern planes and weapons.

► A new and efficient method of handling carbon black shipments will be discussed in the October issue of RUBBER AGE. The method involves "unitized" loading and features the use of a cardboard pallet. Another interesting feature scheduled for the October issue is concerned with safety programs for the smaller rubber plant.

► Readers of RUBBER AGE with an interest in the adhesives industry will be pleased to note that the first issue of ADHESIVES AGE, scheduled for publication in October, will contain a great variety of articles, many treating subjects never before covered in print. Readers of this publication are urged to avail themselves of the opportunity to become charter subscribers.



Typical examples of the tubular wire braid, flat wire braid, wire tape, rope and strand developed and produced by National-Standard especially for the rubber industry.

Wherever wire and rubber work together...

• For half a century, National-Standard has dedicated large scale research and engineering to improving the teamwork of wire and rubber. It is still going on . . . extensive work on wire fabrication, finish, corrosion, strength, elongation, adhesion and other factors that can affect the behavior and cost of your wire-in-rubber products.

So, wherever wire and rubber must work together, it is more than likely that National-Standard can contribute—particularly where new production or new service requirements are involved. We want to be of help . . . and are geared to do it well, without obligation. Check with us now . . . or anytime!

NATIONAL STANDARD

NS NATIONAL-STANDARD Company NILES MICHIGAN

DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; *fine wire, stainless, music spring and plated wires* • **WORCESTER WIRE WORKS, Worcester, Mass.;** *high and low carbon specialty wires*
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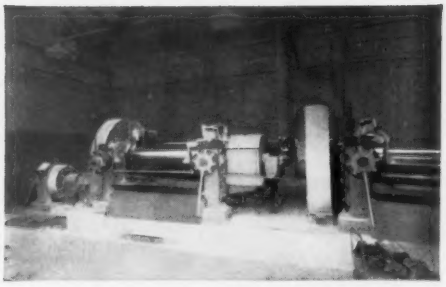
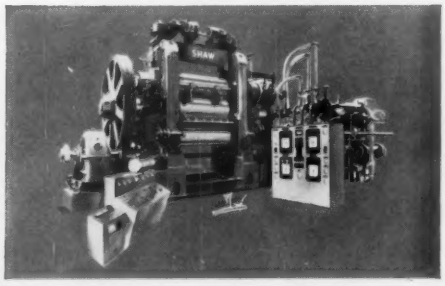
quality engineering puts efficiency into Shaw machines

The cost-cutting performance of every Francis Shaw machine and its thorough dependability are the result of long experience and unvaryingly high standards of engineering in every detail of manufacture.
Close-limit accuracy and rigorous inspection during manufacture guarantee to the user a consistently high quality output from Francis Shaw equipment.



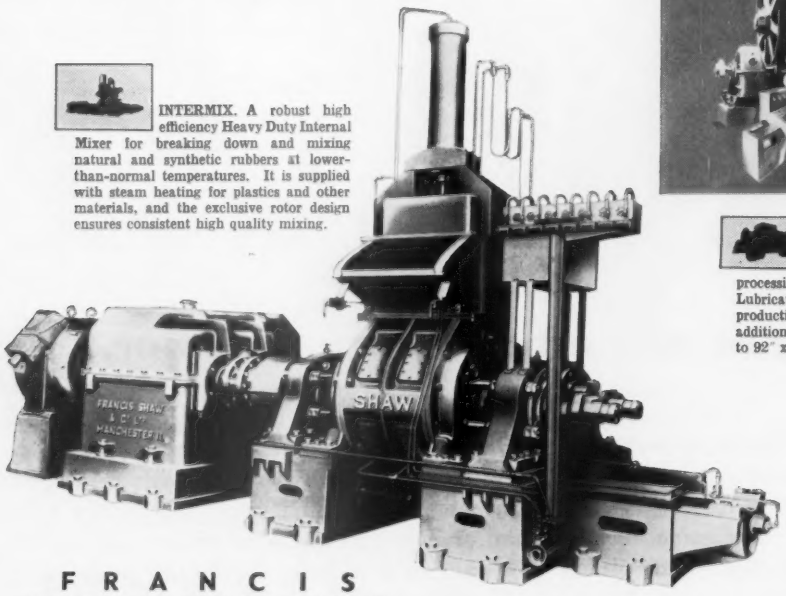
TWO-ROLL MIXING MILL For the efficient mixing and warming of all thermoplastic-thermosetting materials Shaw produce a range of mills from 13" x 16" up to 84" x 26". Supplied in batteries or with individual drives, these machines are capable of high sustained output. Single or double geared models available. The machine shown is fitted with Lunn Safety Gear.

Francis Shaw are available for the design, manufacture and installation of a wide range of processing equipment



INTERMIX. A robust high efficiency Heavy Duty Internal Mixer for breaking down and mixing natural and synthetic rubbers at lower-than-normal temperatures. It is supplied with steam heating for plastics and other materials, and the exclusive rotor design ensures consistent high quality mixing.

CALENDER. A comprehensive range of Francis Shaw Calenders is available for the processing of all rubber and plastic materials. Flood Lubrication and hydraulic roll balancing available on all production sizes. Roll Bending can be fitted as an additional refinement. All sizes available from 13" x 6" to 92" x 32". Two-, Three, and Four-Bowl Designs.



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Manufacturers and processors have already found that Syl-off is the most effective coating for camelback cores, interleaving sheets and shipping bags or containers for tacky crudes, resins or compounds. Paper and paperboard coated with Syl-off save waste material and production time. Even the gummiest products come free cleanly, quickly. This benefits both you in your own plant, and your customer when he unpacks your shipments. In addition, a Syl-off coating is extremely light in weight . . . can save freight on container shipments.

Syl-off coatings are permanent and economical. They will not migrate, transfer, alter the paper stock or contaminate your product. Write today for full information and list of suppliers. Dept. 929.

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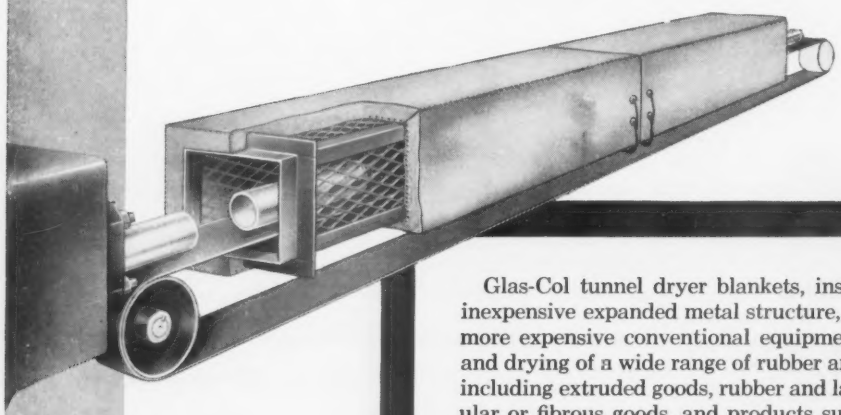
for curing rubber, foam, vinyls . . .

NEW GLAS-COL

electric tunnel dryer blankets



Glas-Col tunnel dryer blankets, installed around an inexpensive expanded metal structure, can do the job of more expensive conventional equipment for the curing and drying of a wide range of rubber and vinyl products including extruded goods, rubber and latex thread, granular or fibrous goods, and products such as mattresses, pillows, and upholstery.

Glas-Col tunnel dryer blankets are well suited for curing and drying applications requiring temperatures up to 1000° F.

And, the cost of a tunnel dryer blanket installation is but a bare fraction of that of conventional equipment . . . heating costs are reduced, too!

Construction and Design: Glas-Col electric tunnel dryer blankets can be engineered for belts of any width or length. For flexibility of manufacture, shipping, installation and maintenance, the blankets are built in multiple units . . . each ranging from four to eight feet in length.

Heating elements, constructed of high-quality resistance wire embedded in layers of glass fabric, are positioned so that the same temperature is maintained from left to right and front to back of the tunnel dryer.

For additional information, contact Glas-Col Apparatus Company, Dept. RA, 711 Hulman Street, Terre Haute, Ind.

GLAS-COL

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ELECTRIC TUNNEL DRYER BLANKETS

U. S. Patents
2,282,078
2,739,220

U. S. Patents
2,231,506
2,739,221

Specialists in production, pilot plant and laboratory heating problems

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Production capacity of UNITANE® titanium dioxide has been doubled at Cyanamid's Savannah, Ga., plant.

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now you're seeing double!

Production capacity of UNITANE® titanium dioxide has been doubled at Cyanamid's Savannah, Ga., plant.

HERE'S WHAT THIS MEANS TO YOU . . .

1. More High-Quality Unitane to satisfy your every requirement.
2. Extra Assurance of Accurate Quality Control. UNITANE is produced with the most modern equipment in the industry.
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4. Expert Research and Technical Service to help solve formulation and application problems.

Call on your Cyanamid Pigments representative for complete information.

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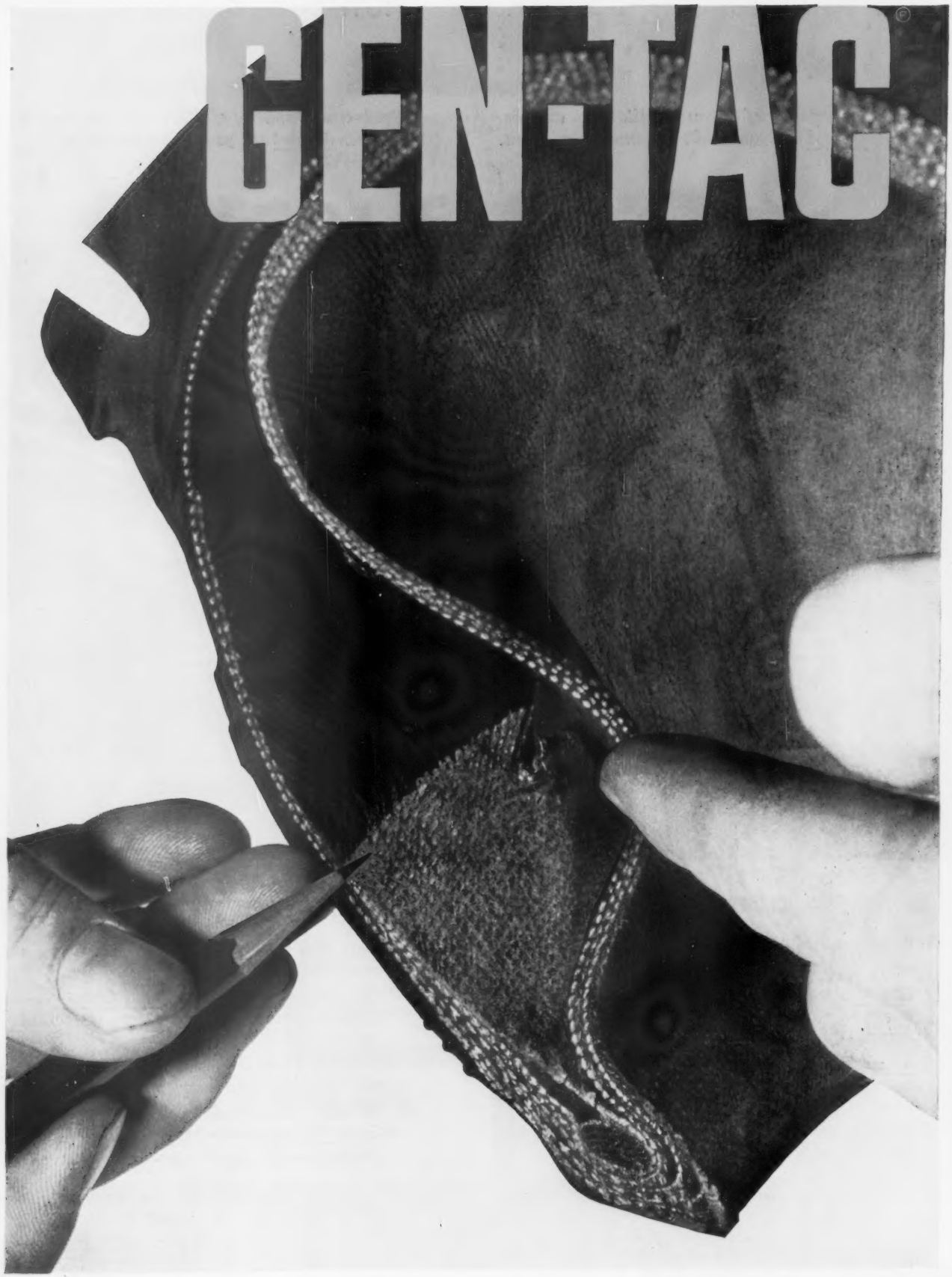
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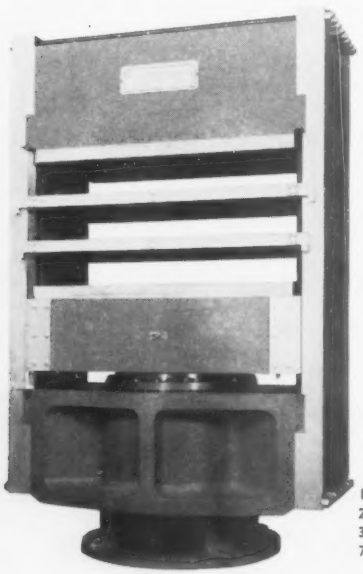

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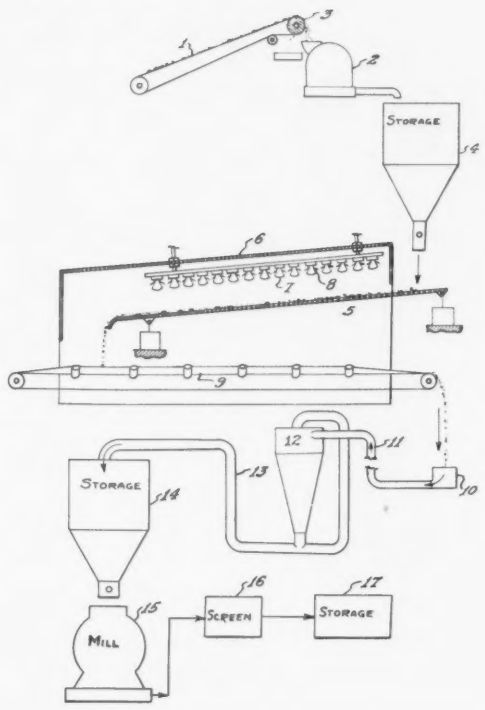
PATENT REVIEW

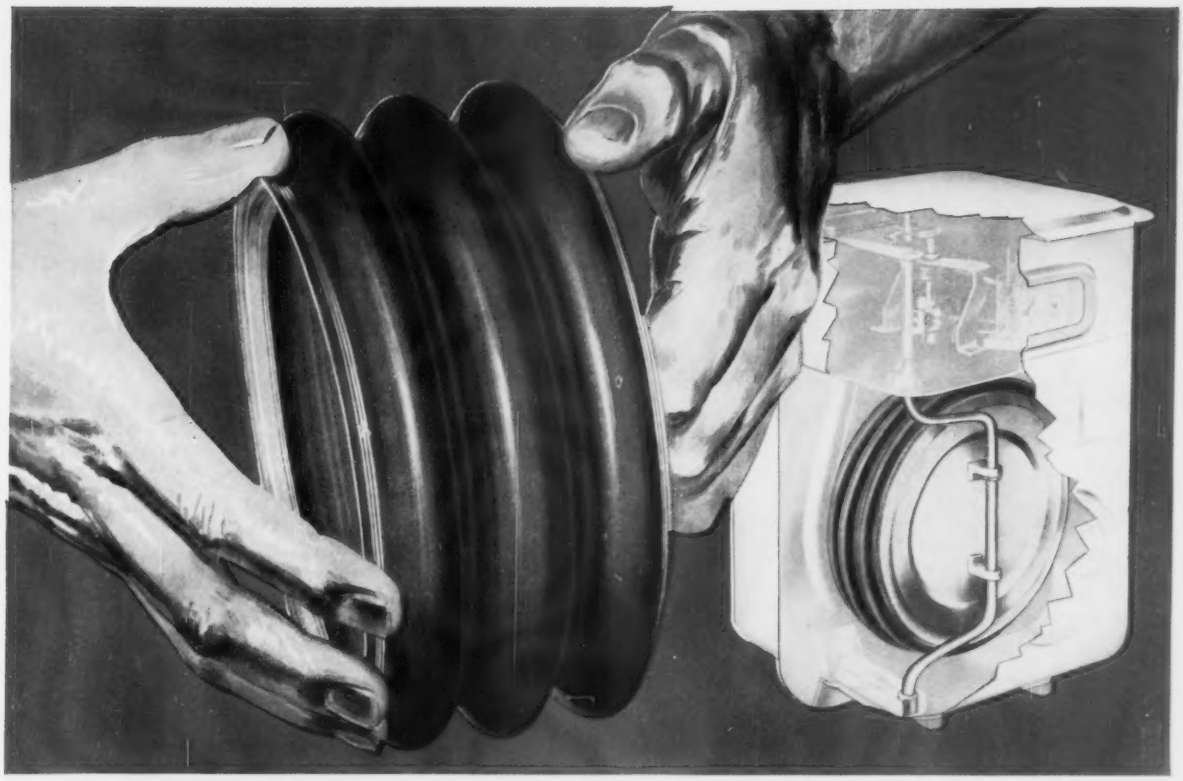
by Melvin Nord

Production of Hard Rubber Dust

U. S. PATENT 2,827,505, issued March 18, 1958 to Walter O. Farrell and Gordon A. Ruschman, assigned to the Richardson Co., describes a process for the production of hard rubber dust useful as a filler in hard rubber curing stocks.



As shown in the schematic diagram a conveyor (1) feeds the scrap materials to a grinder (2). The conveying equipment is provided with a magnetic sheave (3) for the removal of tramp metal. The curing stock is fed into the grinder while any metal pieces are separately collected and disposed of. From the grinder the material is blown to a storage hopper (4). The comminuted material is next subjected to heat in a thin layer while on a suitable conveyor (5). To this end the storage hopper is equipped with a rotary valve to meter and spread the material on the conveyor, and with a gate shut-off. The conveyor (5) is located within an oven (6), open to the atmosphere. The primary function of the heating means is to raise the comminuted stock to curing temperature. This temperature is normally about 350° to 375°F. The relative thinness of the layer on the conveyor and the constant moving of particles insure that all particles will be raised to the desired temperature before they reach



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PATENT REVIEW

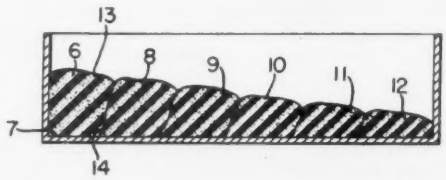
the end of the conveyor. The heated particles are then collected on a slow-moving trough-like conveyor (9) on which vulcanization occurs over a period of 15 to 20 minutes.

The cured stock coming off the conveyor is cooled to 125 to 130°F. by falling into the hopper of an air-conveying appartus (10) and cyclone (12), from which it goes to a storage bin (14). The cooled cured stock is then dropped into a grinding mill (15) is screened, and goes to storage (17).

Manufacture of Polyisocyanate Foam

U. S. PATENT 2,827,665 issued March 25, 1958 to Thomas H. Rogen, Jr., Newell R. Bender, and Theodore R. Ten Broeck, assigned to the Goodyear Tire & Rubber Co., describes a process for producing a cellular flexible structure from a liquid reaction mixture containing an active hydrogen-containing polymeric material, a polyisocyanate and water.

If the liquid-reaction mixture is distributed onto the casting surface while that surface is positioned in a substantially horizontal plane, a reaction takes place which produces a condition in the foaming mixture represented in the schematic below, where that portion (6) of the reaction mixture first distributed onto the mold surface (7) has risen to a level above that of subsequently distributed portions (8, 9, 10, 11, 12) which have had successively decreasing lengths of time in which to foam and expand. Since the foaming reaction mixture, though viscous, remains relatively fluid for some time after the reaction mixture is distributed, the first distributed por-



tion, as it rises due to the foaming action, tends to flow back upon the lower level of the later distributed portion, causing unevenness in the upper surface (13) and the formation of a line of demarcation (14) extending across the width and through the depth of the foaming mixture. For the same reason, the subsequently poured portions cause additional lines of demarcation and additional unevenness in the upper surface of the foaming reaction mixture. Although the last poured portion (12) as well as the earlier poured portions, will eventually reach substantially the same height as the first poured portion (6), the lines of demarcation shown, as well as the unevenness in the upper surface, remain in the finished product. The lines of demarcation detract from the appearance of the finished product and also present weak points in its structure. The unevenness in the upper surface requires that the product be trimmed to provide uniform

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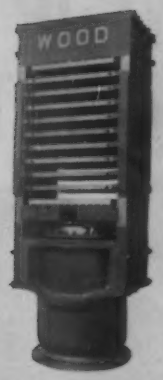

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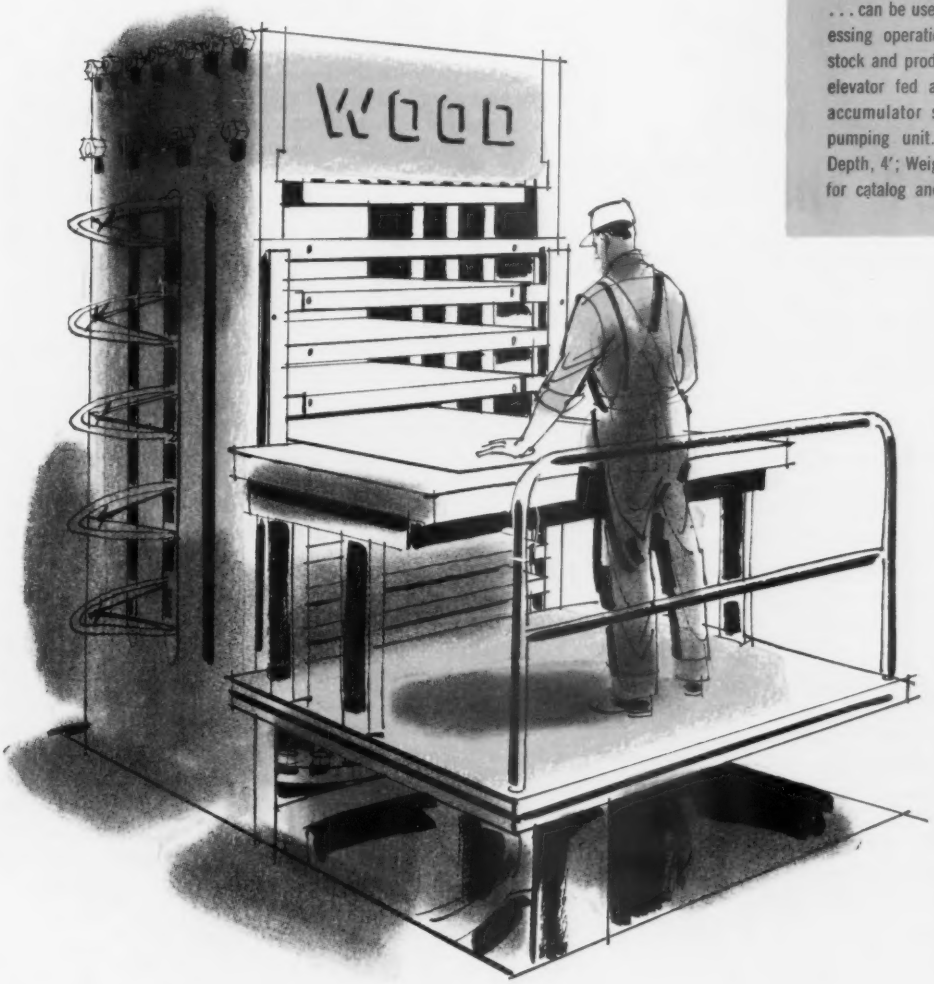

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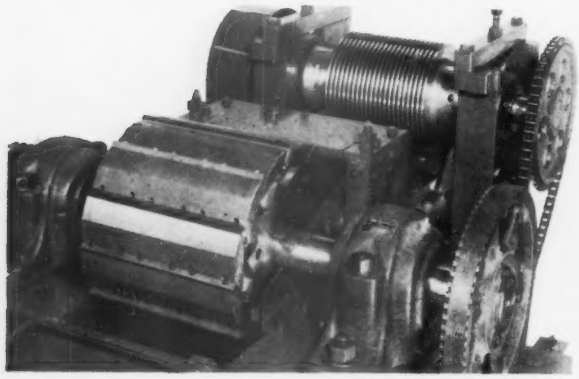

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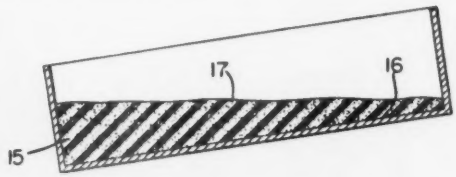
PATENT REVIEW

depth. The trimming is an additional operation, and the material trimmed represents waste, both conditions contributing to increased cost of production.



The diagram above illustrates the condition of a foaming reaction mixture (15) which has been distributed onto the casting surface (16) which has been positioned in accordance with the practice of this invention. It has been discovered that if the surface onto which the reaction mixture is distributed is positioned at an angle below horizontal so that the upper surface (17) of the foaming mixture is maintained in a substantially level condition while the reaction mixture is foaming, the unevenness in the upper surface and the lines of demarcation are eliminated.

Curing of Polyurethanes

U.S. PATENT 2,818,404, issued December 31, 1957 to Frederick B. Hill Jr., and assigned to E. I. du Pont de Nemours & Co., describes a method of curing polyurethane elastomers with a di (isocyanatoaryl urea).

According to the inventor, this method minimizes the tendency towards scorching, and permits careful control of the desired degree of vulcanization. The patent cites eighteen examples of the method, together with the results of physical tests.

Nitrile Rubber Bonded Abrasive

U. S. PATENT 2,822,254, issued February 4, 1958 to George J. Goepfert and Carl von Doenhoff, assigned to Carborundum Co., provides a grinding wheel bonded with a nitrile rubber which will not emit nauseating odors when used for dry grinding.

The ability to overcome the nauseating odors appears to be specific to certain types of diketones, i.e., alpha diketones such as benzoquinone, naphthaquinone, anthraquinone, chloranil, acetyl caproyl, acetyl benzoyl, dibenzoyl, dibenzoylmethane and dibenzoylethylene.

Anti-Skid Tire with Metallic Friction Elements

U. S. 2,808,621, issued October 8, 1957, to Joseph Torrey, Jr., and assigned to the Goodyear Tire & Rubber Co., describes a process for the manufacture of anti-skid pneumatic tires, in which a large number of metallic friction elements are embedded in the tread during the vulcanization.

The method described in the patent involves the use of magnets in the tread-forming portion of the vulcan-

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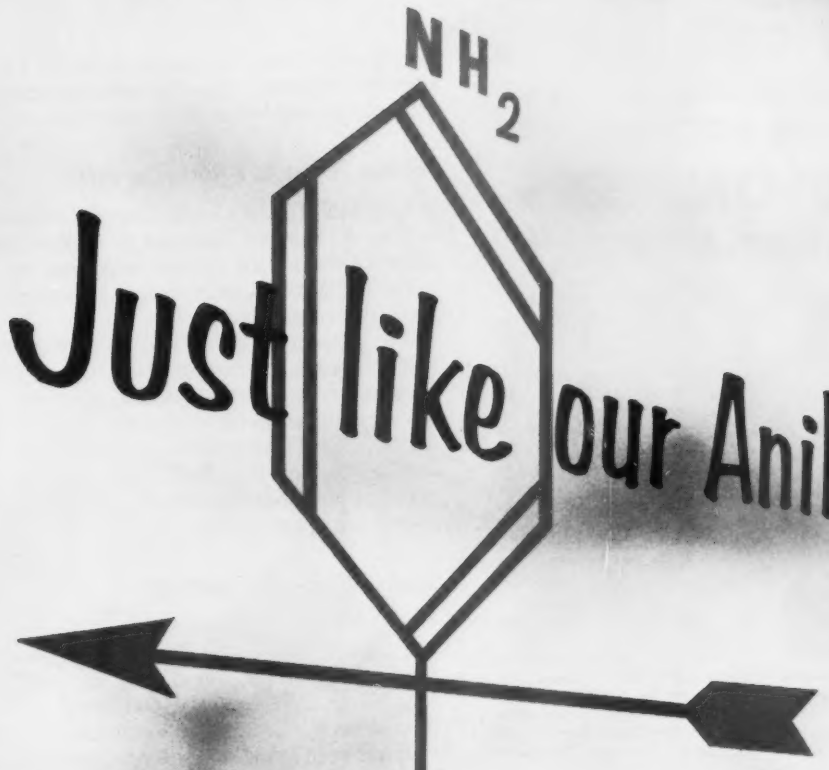

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PATENT REVIEW

izing mold. These temporarily hold the metallic friction elements in place. Upon vulcanization, they become permanently embedded in the finished tire.

Aluminum Powder as a Reinforcing Agent

U.S. PATENT 2,817,642, issued December 24, 1957 to Carl A. Uraneck, assigned to Phillips Petroleum Co., discloses the use of aluminum powder as a reinforcing agent for acid radical-containing rubbery polymers in place of carbon black.

The aluminum powder does not increase the Mooney value as much as carbon black, i.e., it does not make shaping and processing as difficult. Thus, raw rubbers having a higher initial Mooney value can be compounded and processed than is the case when carbon black is used. It is also found that these acid radical-containing rubbery polymers reinforced with aluminum powder are resistant to ozone.

Delayed Vulcanization Accelerator

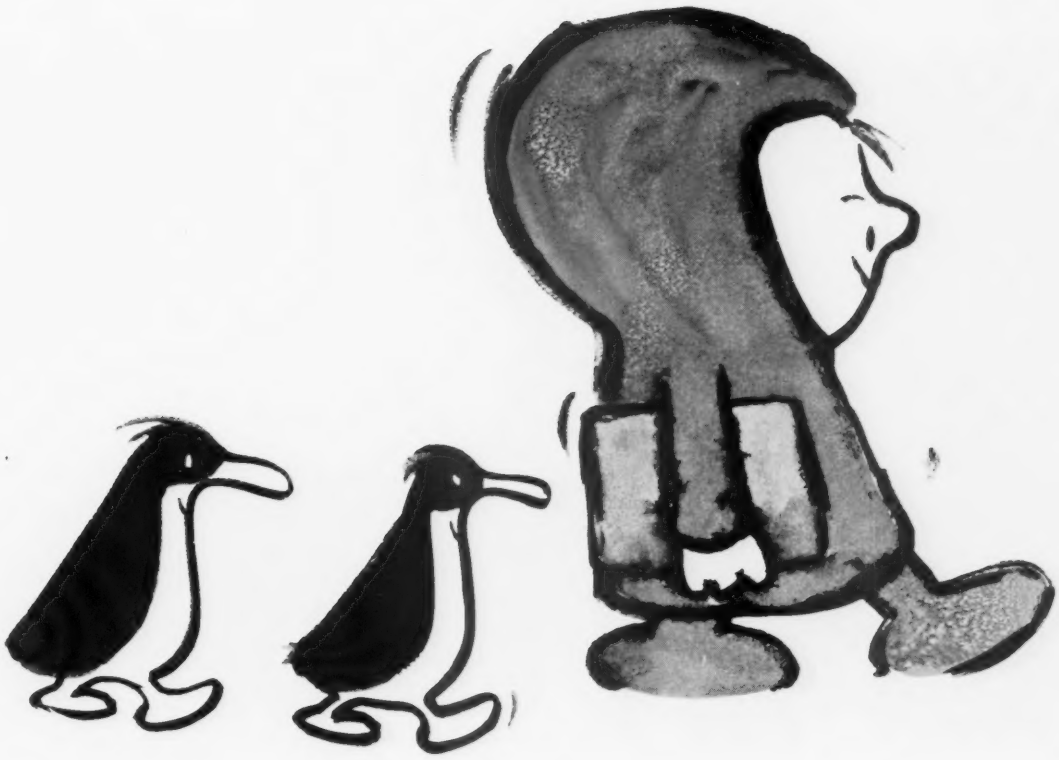
U.S. PATENT 2,816,881, issued December 17, 1957 to Frank A. V. Sullivan, Edwin O. Hook, and Arnold R. Davis, assigned to American Cyanamid Co., discloses the use of 2-benzothiazol sulfene-2, 6-dimethyl morpholide as a vulcanization accelerator.

It has been found that this compound exhibits excellent delayed action, giving high processing safety against initiation of vulcanization during the mixing and calendering operations. This is particularly so when employed with high pH furnace blacks. It is not objectionable as a skin irritant or sensitizer, nor does it possess a disagreeable odor. It imparts little or no discoloration to the final rubber product. It may be employed with natural or vulcanizable synthetic rubbers.

Other Patents Of Interest

Subject	Inventor or Assignee	Patent No.	Date
Plastic tube extruder	Firestone Tire & Rubber Co.	2,821,745	2/4/58
Safety tire construction	Firestone Tire & Rubber Co.	2,822,015	2/4/58
Wheel, tire, and trim ring assembly	B. F. Goodrich Co.	2,822,016	2/4/58
Tubeless tire and divided rim assemblies	B. F. Goodrich Co.	2,822,017	2/4/58
Tubeless tire	B. F. Goodrich Co.	2,822,018	2/4/58
Chafer gum strip	Firestone Tire & Rubber Co.	2,822,019	2/4/58

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.



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Dies are shown mounted in a steel frame positioned vertically above the bed area. When the frame holding the Dies is in the extreme upward position shown here it is 30" from the bed plate for easy loading and unloading of thick slab material, and to allow roll stock to move easily across the bed. When the die frame is automatically lowered into cutting position, the roller passes over the back of the Die Board, instead of directly over the dies and material.

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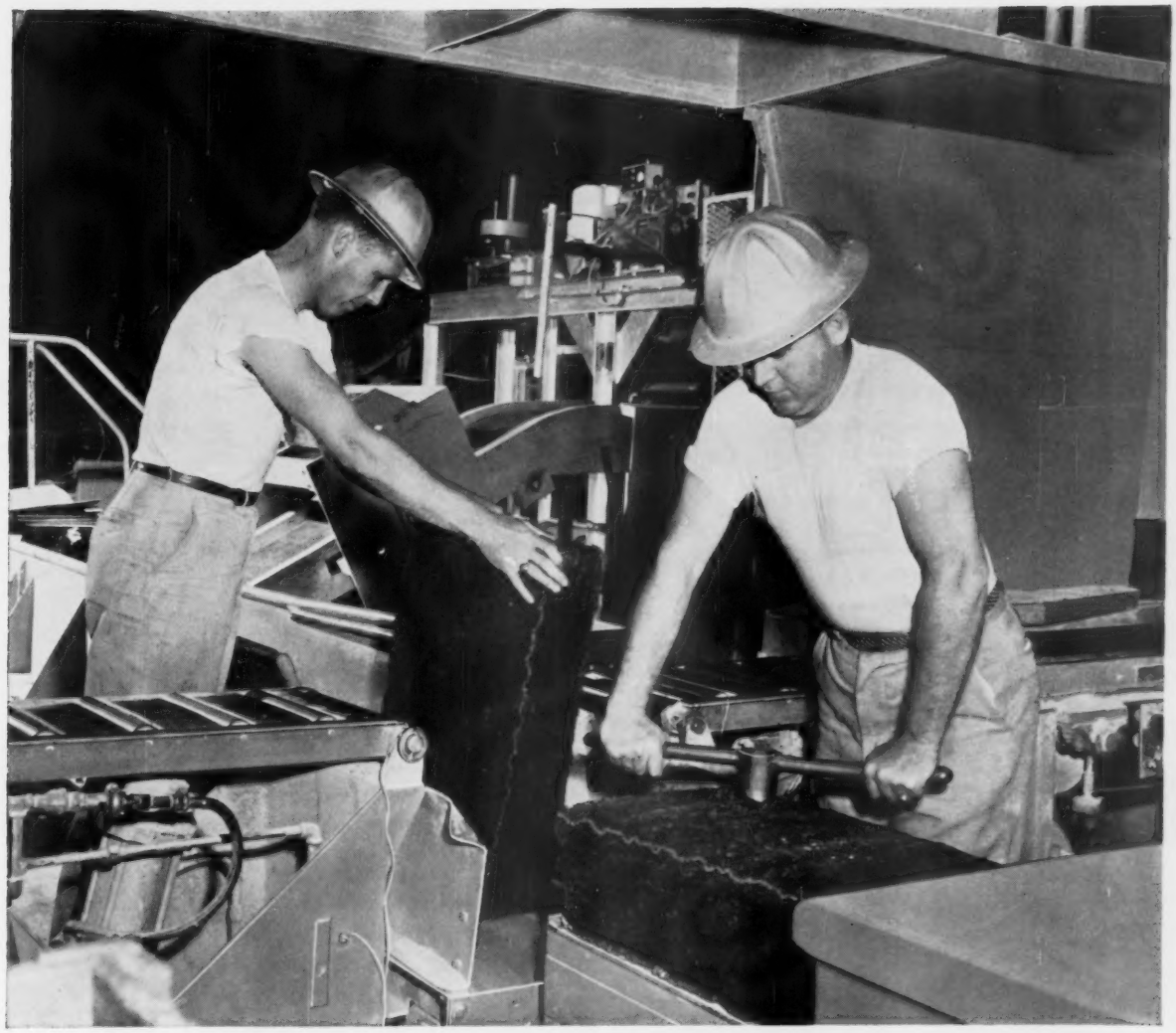

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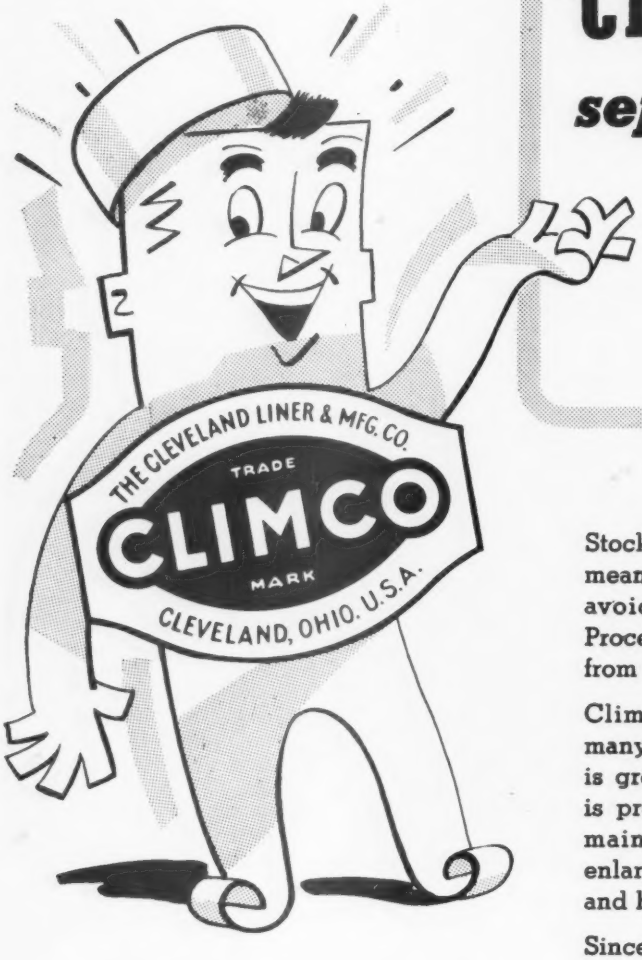

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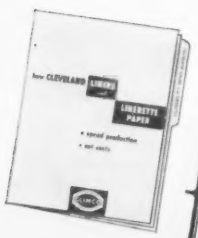

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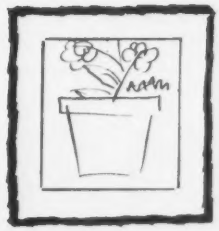

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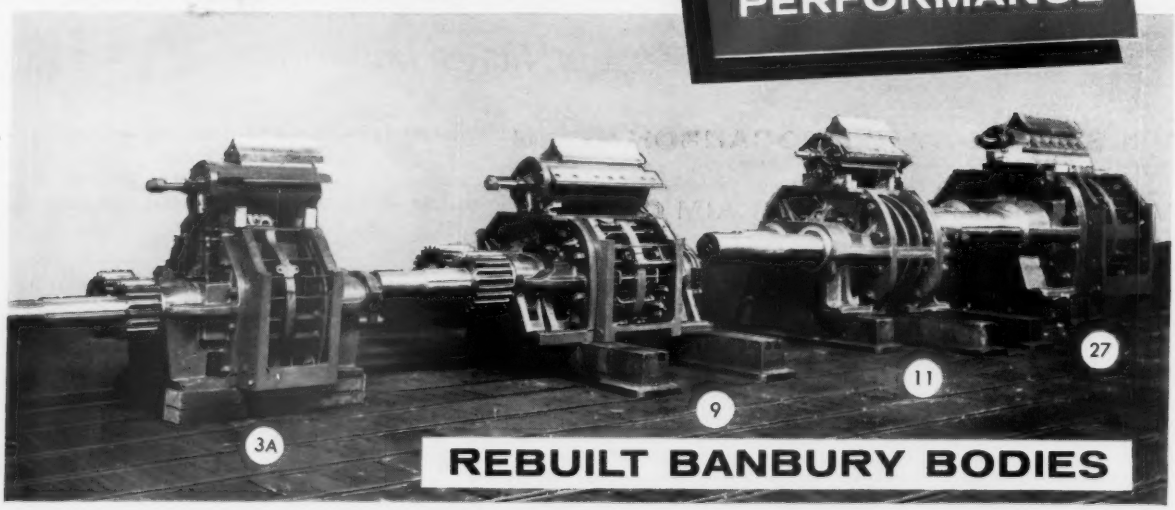

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THE BUSINESS OUTLOOK IS NOW A LOT BRIGHTER than it seemed just a month or so ago. Instead of a long, slow recovery, economists in industry and the government now look for a fairly fast upturn to appear by year-end. Some even expect business activity to get back up to the pre-recession peak by that time, some six months earlier than was previously being forecast. Developments in the Middle East are responsible for the switch in thinking.

The extra stimulation is NOT coming from increased spending for defense. Basic military procurement plans are not being changed, though the economy policy of discouraging full use of money voted for conventional arms is likely to be eased. (This might increase spending by hundreds of millions—not billions.) Defense spending will rise only 3% by the Winter.

But look for a subtle—and significant—change in psychology.

- Consumers feel more secure about jobs, and will worry more about inflation. Some will react by advancing the dates of purchases of homes, cars, appliances. So sales will gain.
- Businessmen in many cases are finding present inventories too low for this situation. They'll have to boost ordering. They may rush some plant-building to beat out higher costs.

NOTE THE CONSUMER'S GOOD FINANCIAL HEALTH which puts him in very fine shape to expand buying if he's given a reason for doing so. The recession has not hurt the big majority of families. Income is now about as high as it was at the pre-recession peak—and is on the rise. Savings are jumping. And, because folks have recently been buying fewer houses, autos, washers, etc., their needs and desires have been growing, creating backlogged demand.

Surveys show that less and less consumers are now in a "no-buying" mood. More are wondering if this isn't a good time to buy postponable items. All that they need is some push. The Middle East crisis has now provided it—not a rush to buy just anything, but a feeling of confidence in the future.

CHANCES OF A LEVELING IN PRICES HAVE BEEN KILLED by recent events. For a while this Spring it looked as if big crops, improving productivity, and industry's efforts to economize would check the climbing of the indexes. But now, as demand picks up, there'll be temptation to pass on rising costs by makers of steel, autos, etc. (Many commodities have already moved up.) Unions are likely to get tougher, and a slow upward spiral could soon start.

The government's efforts to curb inflation will center in making money tighter. It will take a much graver emergency than we have seen for the President to call Congress for any controls on prices or wages or rents or instalment buying.

THE WORST IS OVER FOR CORPORATE PROFITS—another sign that business is poised for a brisk pick-up. As you may recall, earnings after taxes for industry as a whole fell between 20% and 30% in the first quarter of 1958. Further drops were expected in the second quarter. But tabulations of the statements of hundreds of companies show little change, over-all. Indeed, some industries—food, building materials—reveal nice gains. In the last quarter of 1958, profits are likely to rebound sharply all along the line.

(Continued on Next Page)

BUSINESS IN CANADA IS ENDING ITS RECESSION at a fast clip—one more bit of evidence that an upturn is coming in this country. Canada's economy is so closely related to ours that it generally moves in the same direction within a few months. The Canadian slide began just before things fell here. Now, there are plenty of signs of a big recovery up North—in jobs, output, housing, and consumer spending. Even consumer durables are moving rapidly. Canadian government spending and financial policies are getting the credit.

YOU'LL SOON SEE BIG GAINS IN PRODUCTIVITY—output per manhour—as a by-product of the recovery that's coming. This generally happens during an upturn, when production runs get longer. This time, though, the trend is being helped by the record investment in modern capacity of recent years—an investment that hasn't yet paid off because of low recession production.

> In manufacturing, the increases may average as high as 6% in the next 12 months—varying from industry to industry, of course. Gains ran about 1.5% in 1956 and 2% last year. In nonmanufacturing, productivity will zoom, but not as fast.

THERE WON'T BE ANY INCOME-TAX CUTS NEXT YEAR, either, say Congress' tax specialists. Before winding up to go home, they reviewed the current Budget picture—spending as well as revenue. It shows a deficit for the 12 months due to end next June 30 in the area of $10 billion. (Another deficit is in prospect for the following year, too.) And any tax cuts will only add to the red ink. They would also feed the inflation that is again feared. The tax actions likely will deal with excises, loopholes, hardships, etc.

OPPORTUNITIES IN ALASKA ARE NOT ALL AS GOLDEN as folks have heard. That's the word from officials about profit possibilities in the new state. There's a lot of inflation; prices average 40% to 50% over those down here. What's more, American military bases are a large part of Alaska's economy. This means that the scope for many small businesses tends to be restricted. Note, too, that it takes more capital than down here—even for small firms.

> Officials warn that there will probably be plenty of stock schemes based on the interest that statehood has aroused. Promoters will be floating ventures in oil, metals, etc.

HOW TO DEAL WITH GOVERNMENT OFFICIALS—what is the proper approach? That's always been a problem for businessmen—long before the Goldfine case. They can't avoid dealing with big-buying state, local, and federal units—governments which also impose complex rules and regulations, tax laws, etc. Personal contacts become necessary—but which ones are proper and which not?

> Old Washington hands suggest these logical guidelines:
> •Play things straight. Ask for all that you're entitled to. But don't ask for favors. "Use the front door, not the back."
> •Call your Congressman if you feel you're not fairly treated at any agency. He can check, but don't ask him to pressure.
> •Entertain at lunch or dinner if such contacts will let you clarify background points. But don't give sports tickets or tips on horses or stocks. And don't pay any hotel bills.
> •Don't give any gifts—cash or kind—even at Christmas time.
> In a nutshell, the best guide is said to be good common sense.

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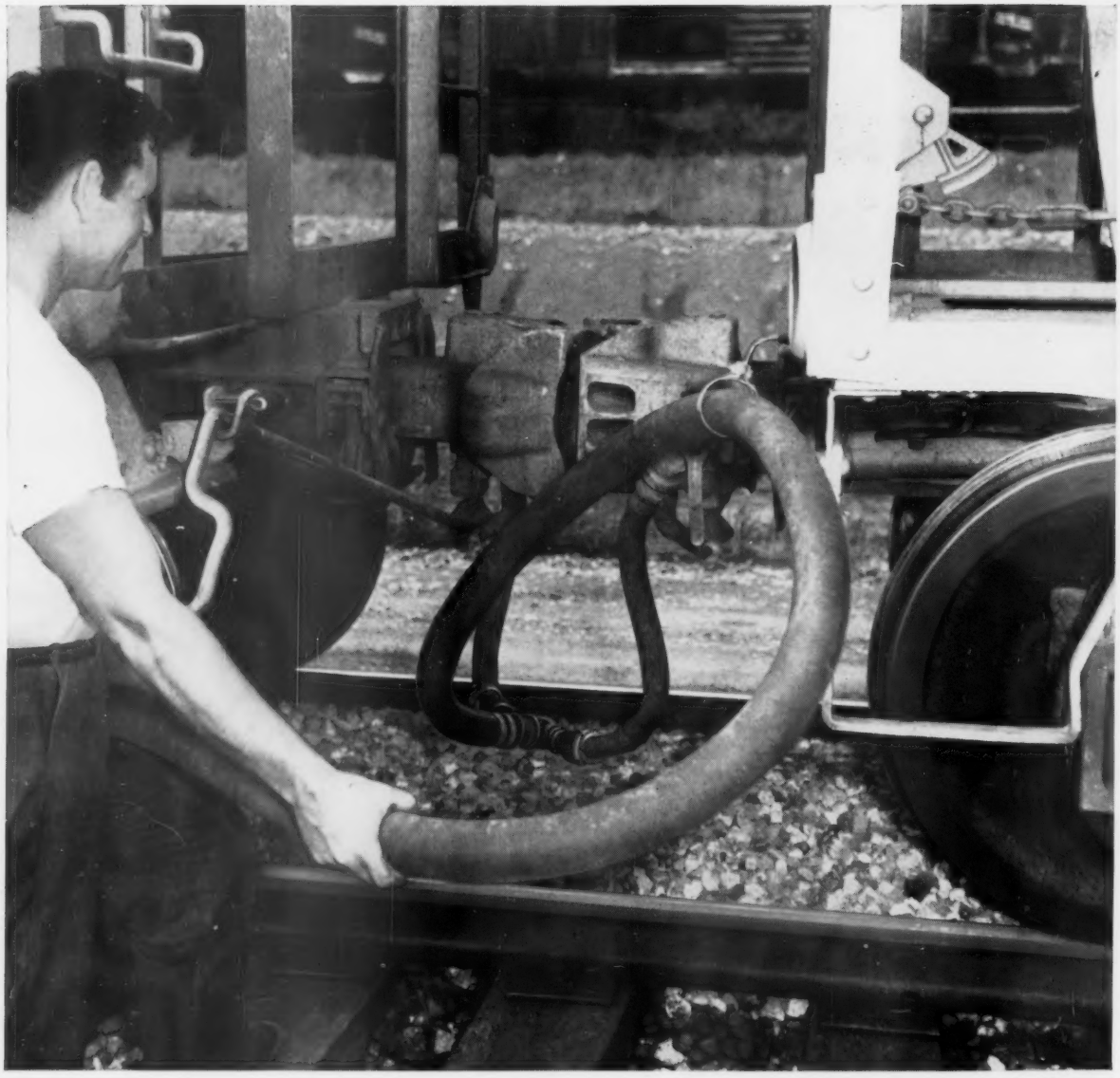

PROGRESS UNDER PRESSURE—Typical of Southern Railway's emphasis on progress, safety and modernization is a unique, four-mile compressor system installed in its yards in Birmingham, Alabama. Air hoses similar to the one shown are spaced at 1000 ft. intervals and are fed by means of a 4" pipe from a central compressor reservoir. When three or more of these hose extensions are hooked up to a freight train, the necessary air pressure can be built up in much less time than by charging with pressure generated from the locomotive. Another important advantage to this independent source of air pressure is that it permits the discovery and repair of line leaks before the engine is coupled to the train, thus minimizing the possibility of expensive delays. The hose used for this air pressure system was supplied by Carolina Rubber Hose Company and made from Mount Vernon duck.

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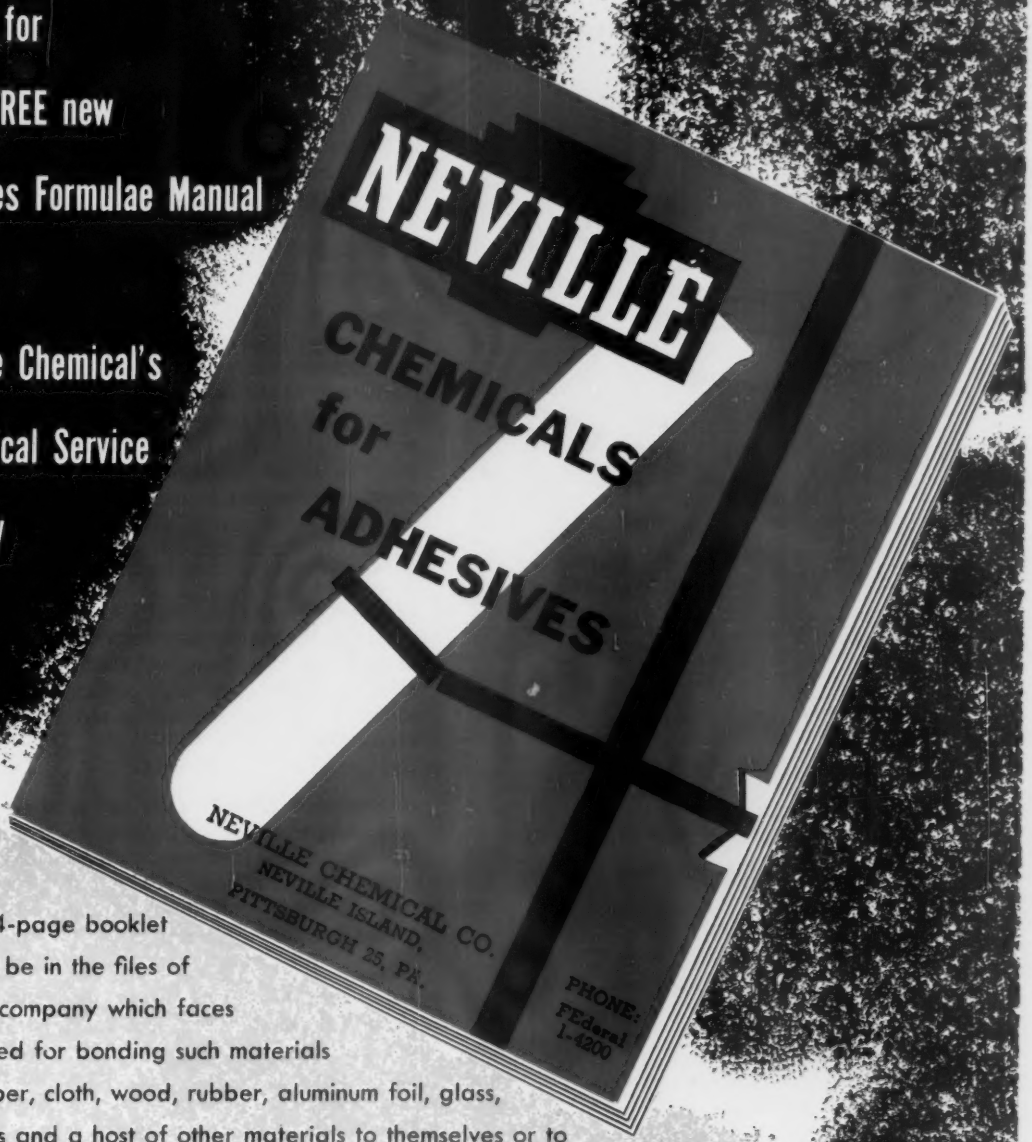

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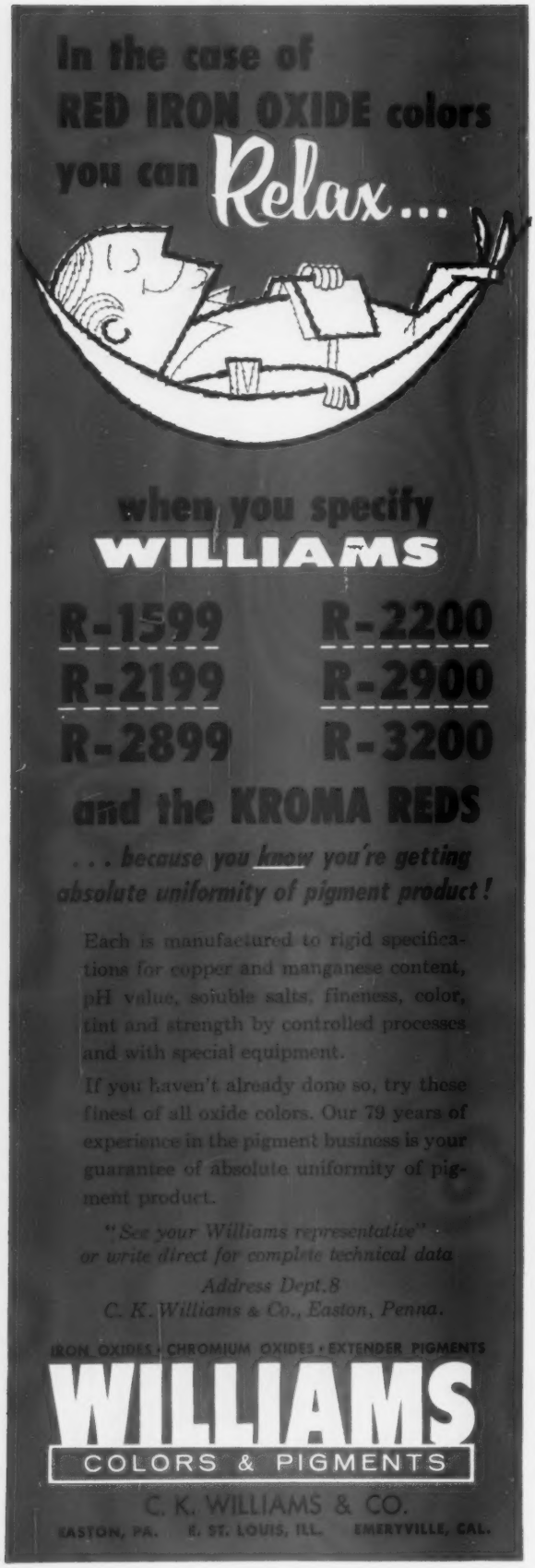
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Overseas

Istanbul—Trade sources disclose that experimental planting in Turkey of guayule rubber has proved successful. In the Antalya area, farmers intending to grow this plant are to receive a subsidy of T £ 80 per doenum (about a quarter of an acre). It is also reported that negotiations with foreign investors have begun on the setting up of a rubber processing factory in Antalya. It is hoped that the plant will be in production in 1960.

Colombo—Rubber producers in Ceylon are asking the government to help the industry prevent the closure of plantations in the face of low returns. The government recently reduced the export duty from 28c (6c-U. S. A.) to 20c (4c-U. S. A.), but the Finance Minister has warned that this action is only a temporary measure. Rubber planters claim that high export duties are pricing them out of the work market and while they welcome the cut in duty, they consider it inadequate.

Pretoria—Inquiry into the existence of monopolistic conditions in the supply and distribution of pneumatic tires in South Africa will be conducted by the Board of Trade and Industries. Interested parties have been invited to submit representations to the secretary of the board in Pretoria.

Singapore—Rubber traders and producers in Singapore and Malaya are about to form a Pan-Malayan Rubber Association and subcommittees are working on the completion of a draft constitution. Representatives of various rubber organizations are expected to meet shortly for an inaugural meeting.

Johannesburg—A new firm in Johannesburg is manufacturing a range of polyethylene containers intended mainly for the chemical industry. The company manufactures drums, tanks and loose sleeves which fit into metal drums and tanks with capacities ranging from a few gallons to more than 200 gallons.

Manchuria—A new chemical center in Kirin is to have a synthetic organic chemicals plant for the production of synthetic rubber, synthetic fibers and plastics. The first plastics plant in Peking, now under construction, is to produce PVC. Under the second five-year plan, which ends in 1962, production of plastics is expected to be 200,000 tons annually.

Deusseldorf—Buna-Werke Huls, a new installation which is 50 per cent owned by Chemische-Werke Huls, has started large scale production of synthetic cold rubber and is expected to produce about 30,000 tons of synthetic this year. Improved production methods have enabled capacity to be raised to 70,000 tons annually from the the 45,000 tons originally planned. The plant's output will be sold at world market prices.

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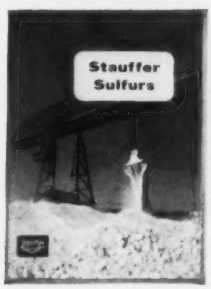

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Lisbon—Firestone Tire and Rubber Co. plans to build a factory at Setubal, near Lisbon, which will cover between 300,000 to 500,000 square feet. The facility is expected to be in operation within a year.

Singapore—The first consignment of Malayan rubber for Poland has been loaded on a Polish freighter in Singapore. Further shipments were expected to have been taken on at Penang and Port Swettenham, bringing the total to 3,800 tons, before the vessel was to have sailed for Gdynia.

Deusseldorf—Chemische Werke Huls plans to construct a plant for the manufacture of low-pressure polythene. Production is expected to start this year at the rate of 500 tons a month.

Djakarta—Ten thousand tons of rubber have been piled up in Djambi, South Sumatra, since the stoppage of barter trade last Spring. A spokesman said that there are eight thousand tons of rubber and five thousand tons of other commodities piled up in the port of Sibolga.

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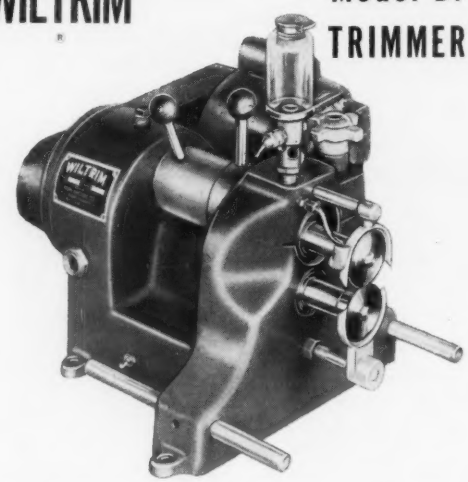

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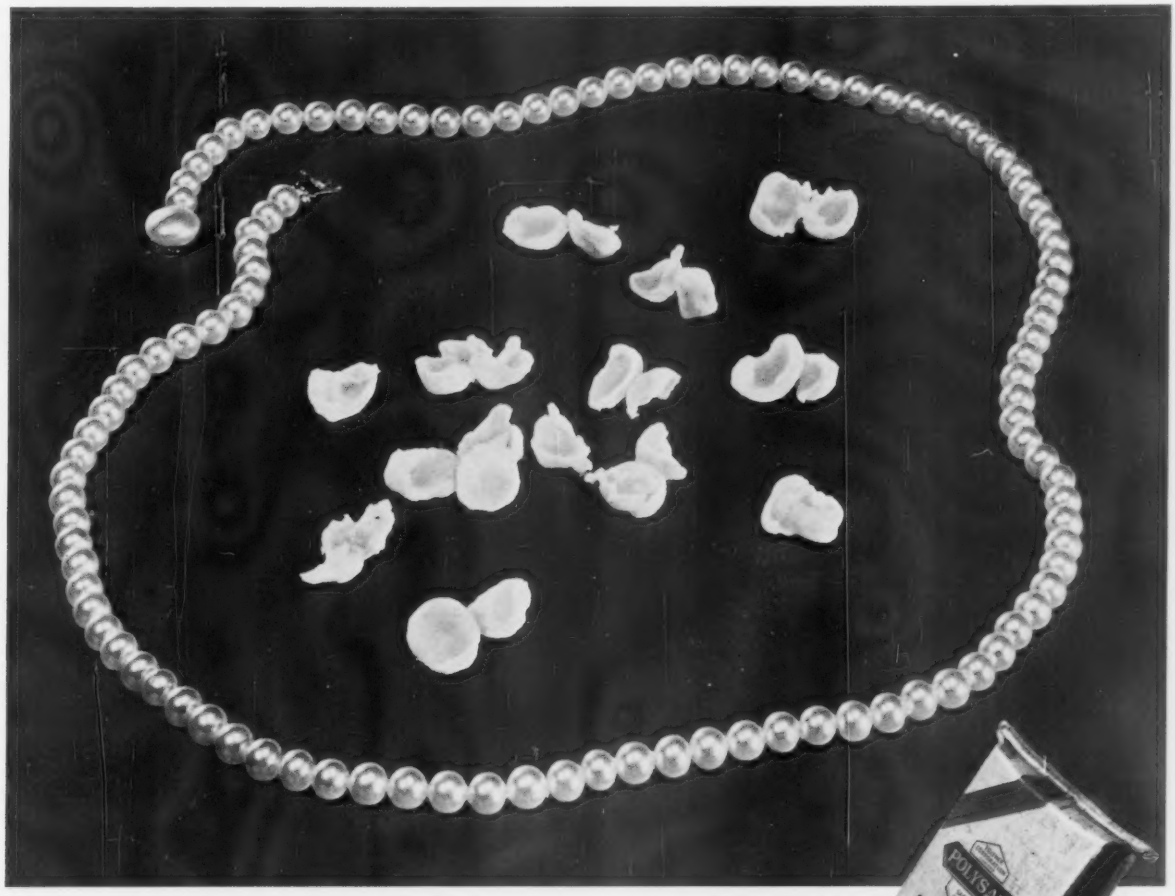

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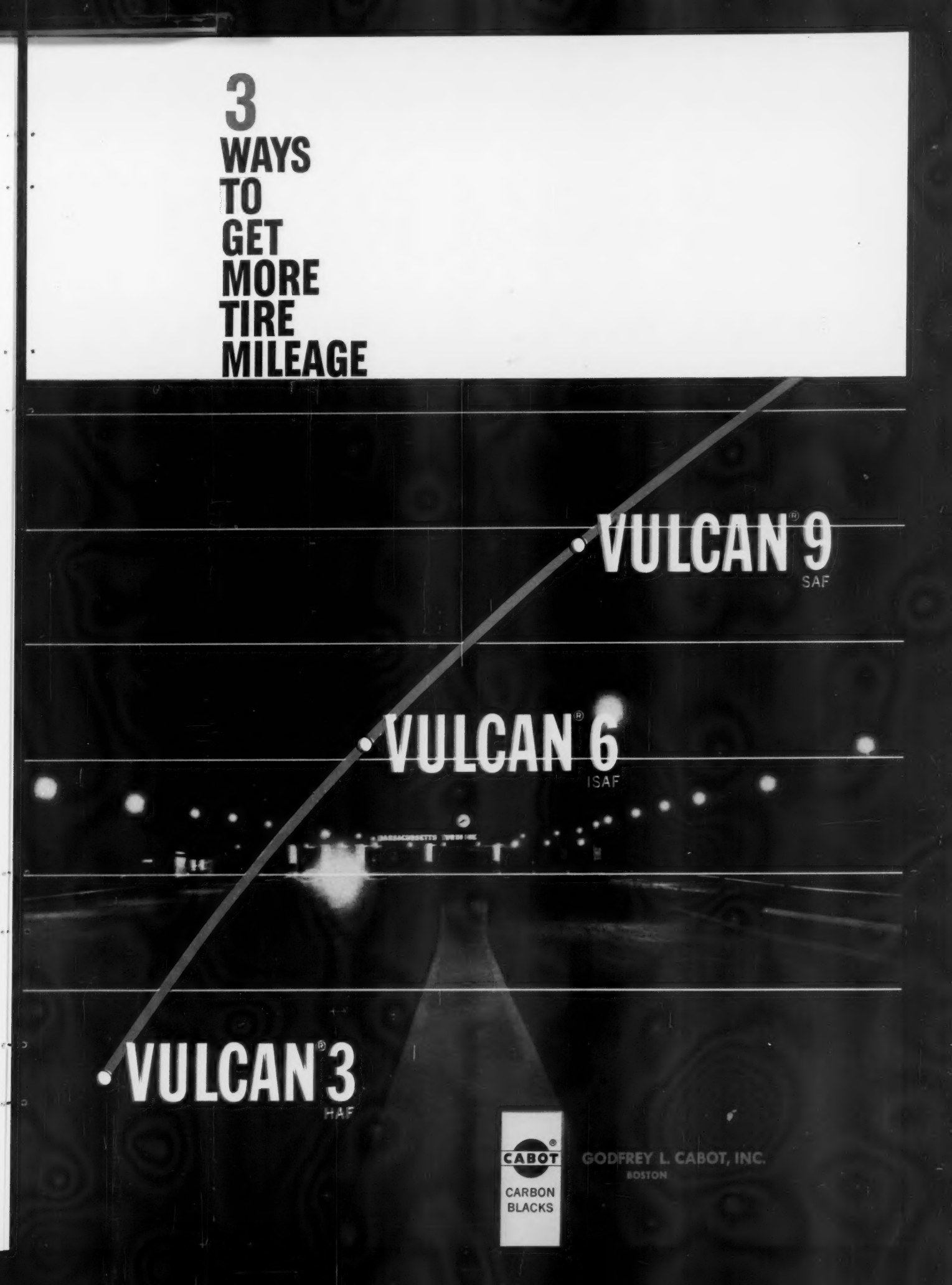
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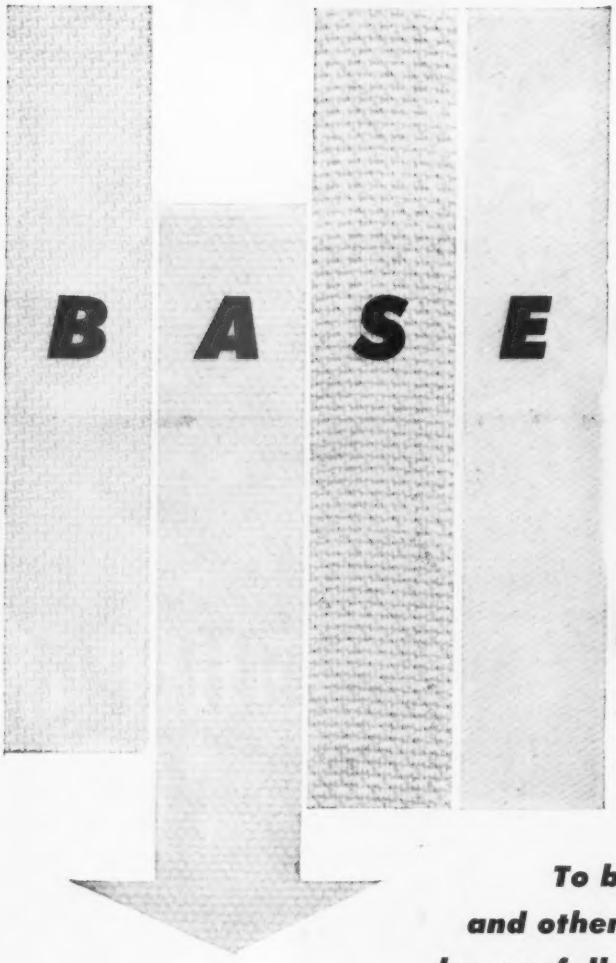

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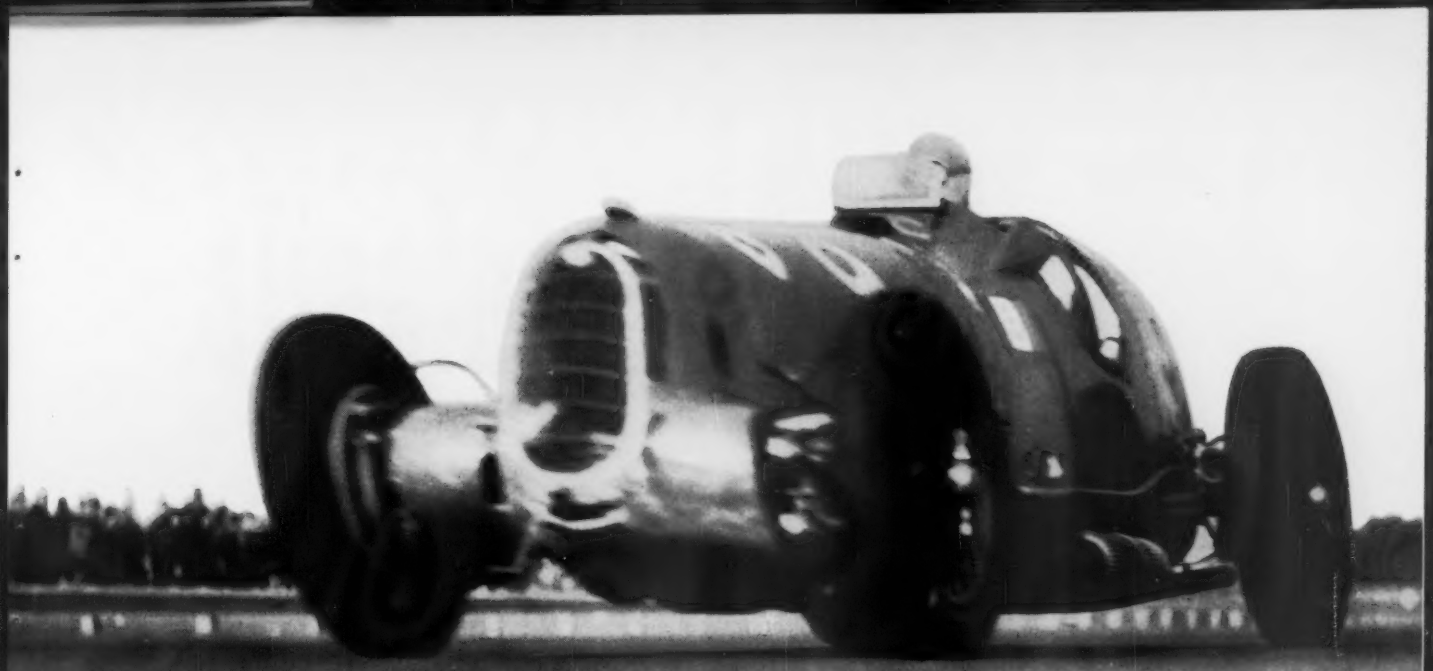

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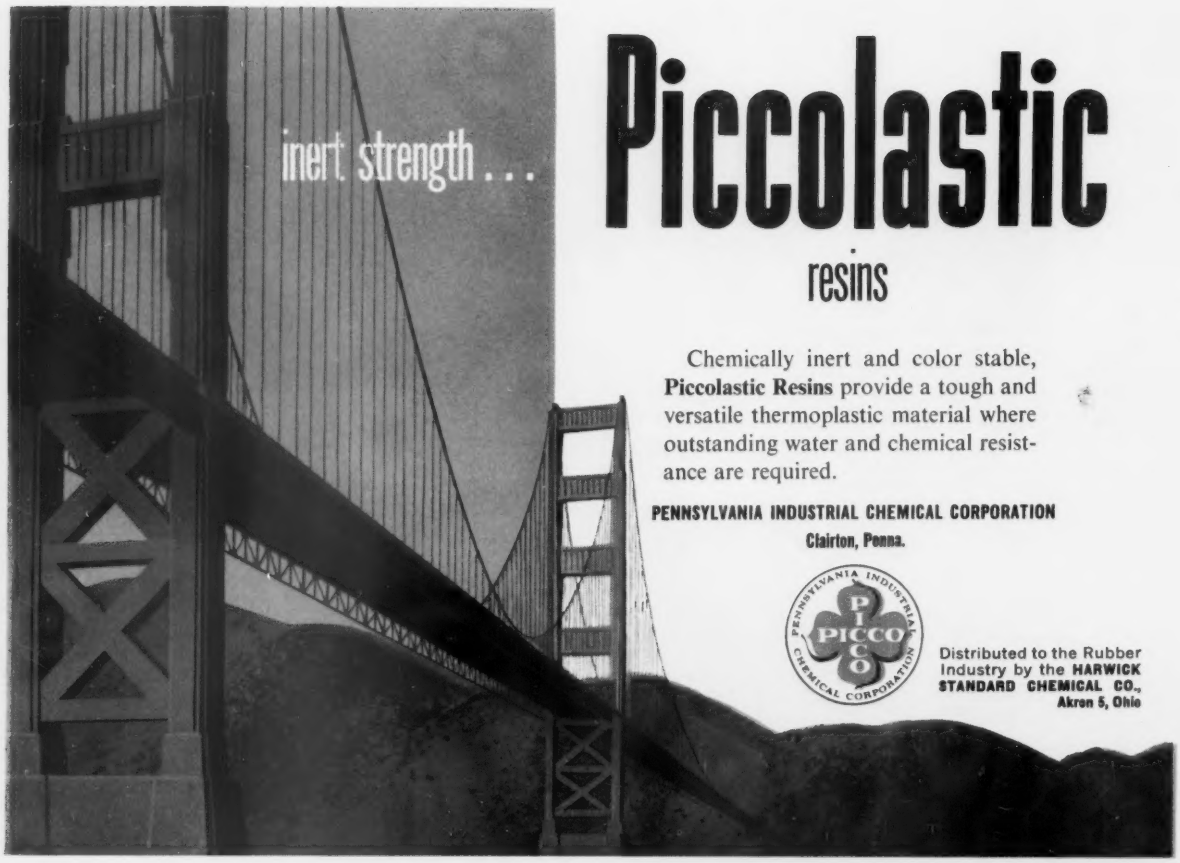

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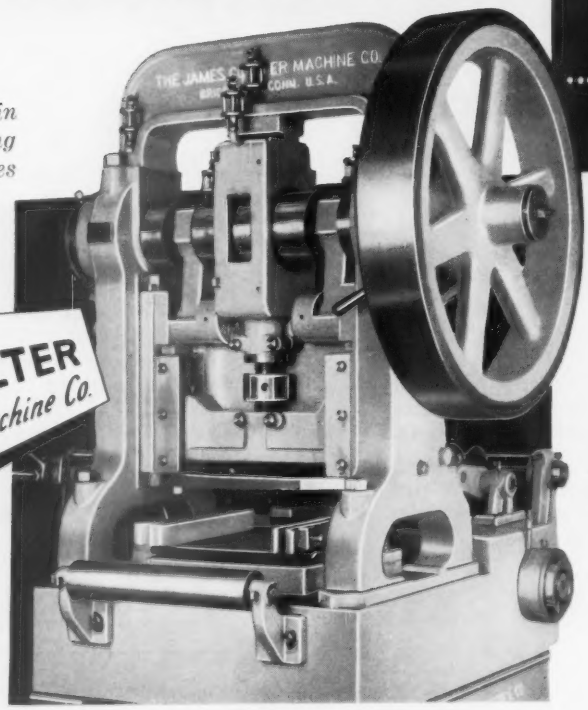

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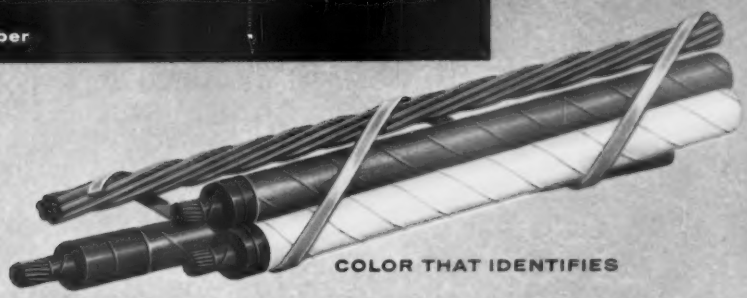

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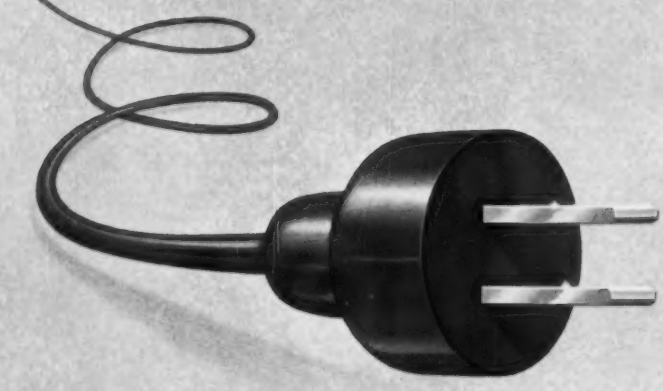

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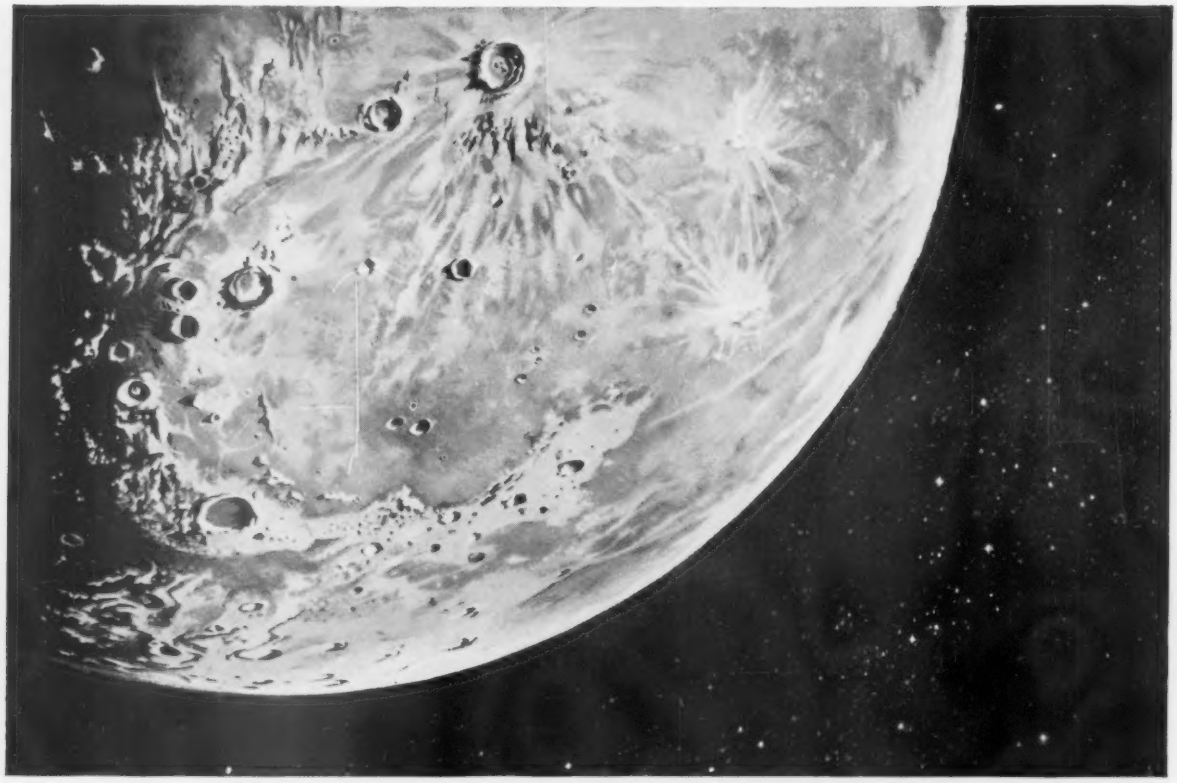

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Rubber Age

Vol. 83, No. 6 September, 1958

Quantitative Determination of Dithiocarbamates and Thiuram Sulfides

A spectrophotometric method for the analysis of certain dithiocarbamates and thiuram sulfides in rubber stocks

By C. L. HILTON and J. E. NEWELL*

Research Center, United States Rubber Co., Wayne, N. J.

VARIOUS methods have been proposed for the determination of dithiocarbamates and thiuram sulfides. Twiss and Martin *(1)* determined ammonium salts of the dithiocarbamates by means of Nessler's reagent. Callan and Strafford *(2)* liberated carbon disulfide by distillation with sulfuric acid. The xanthate formed was then titrated with iodine. Thiuram sulfides were first reduced with magnesium turnings in alcoholic solution. Several investigators *(3-5)* utilized a colorimetric method involving a copper salt plus diethylamine. Titration with 0.1 N nickel sulfate using dimethyl-glyoxime as an external indicator has been used *(6)*. Morrison and Shepherd *(7)* found that the thiuram disulfides were converted into dithiocarbamates by a color reaction with copper oleate. Copper salts have been used in recent investigations also *(8-12)*.

Still other methods have been proposed. Kul'berg and Blokh *(13)* oxidized the compounds with nitric acid, precipitated the sulfate formed as barium sulfate, and determined the latter gravimetrically. Ferrera *(14)* titrated a carbon tetrachloride solution containing hydrochloric acid with 0.1 N bromate-bromide mixture. The diethylamine was distilled into measured hydrochloric acid. Recently, Mann *(15)* was able to analyze for various accelerators by ultraviolet analysis after chromatographic separation. A list of some of the available methods has been compiled by Patterson *(16)*.

The method described in this paper has been developed for the determination of the zinc dithiocarbamates and thiuram sulfides in rubber. It involves extraction from the rubber stock by means of ethanol, decomposition of the accelerator to form carbon disulfide, distillation of the carbon disulfide into an aqueous dimethylamine solution, and spectrophotometric analysis of the resulting mixture.

The dithiocarbamates are decomposed by heating in ethanol acidified with phosphoric acid. The thiuram sulfides, on the other hand, must first be reduced by

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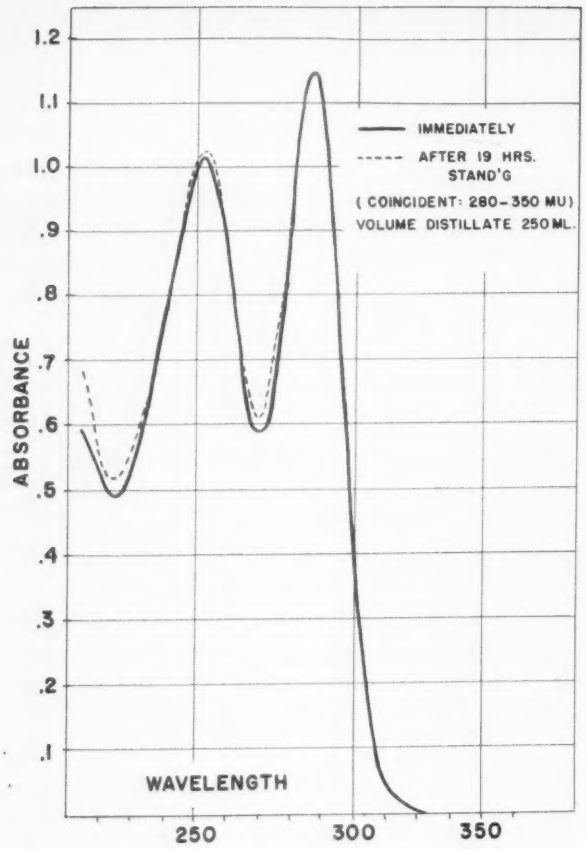

Figure 1—Distillate from pure ethazate.

means of sodium hydrogen sulfite. In view of the discovery that thiuram sulfides are converted into dithiocarbamates during vulcanization *(7)*, the method has been developed in such a way that the dithiocarbamates and the thiuram sulfides can be determined separately. The analysis could then be used as a measure of the degree of conversion. It should be pointed out that the copper, nickel, iron, and selenium salts cannot be determined by this method. However, the color of the alcohol solution may indicate which of these is present.

Determination of the Dithiocarbamates

When the accelerator in the sample is subjected to extraction and decomposition in acidulated alcohol, the zinc dithiocarbamate series decomposes according to the following equation:

$$(R\text{-}NH\text{-}C(=S)\text{-}S\text{-})_2 Zn + 3H_3PO_4 \longrightarrow 2(R\text{-}NH)\cdot H_3PO_4 + Zn(H_2PO_4)_2 + 2\,CS_2 \quad (1)$$

The liberated carbon disulfide is distilled into an excess of dimethylamine, which is optically transparent in the region from 260 to 300 millimicrons. As shown in Figure 1, the product formed according to the following equation has absorption maxima at 253 and 287 millimicrons, and minima at 225 and 270 millimicrons.

$$CS_2 + 2\,CH_3\text{-}NH\text{-}CH_3 \longrightarrow CH_3\text{-}N(CH_3)\text{-}C(=S)\text{-}S\text{-}H\cdot H\text{-}N(CH_3)_2 \quad (2)$$

There is slight absorption by dimethylamine at 250 millimicrons. Figure 1 also shows that the absorption spectrum of the distillate remains constant from 280 to 350 millimicrons even on 19 hours standing. Consequently, the readings for the absorbance at 287 millimicrons were used in developing the equation.

Determination of the Thiuram Sulfides

After the determination of the dithiocarbamates has been completed, the residue is neutralized with dilute sodium hydroxide and an aqueous solution of sodium hydrogen sulfite is added. The thiuram disulfides are then decomposed according to the following equations:

$$3\,(R\text{-}N(R)\text{-}C(=S)\text{-}S)_2 + 2NaHSO_3 + 2H_2O \longrightarrow 6\,R\text{-}N(R)\text{-}C(=S)\text{-}S\text{-}H + 2Na_2SO_4 \quad (3)$$

$$R\text{-}N(R)\text{-}C(=S)\text{-}SH \xrightarrow{HSO_3^-} R\text{-}NH\text{-}R + CS_2 \quad (4)$$

The distillation and determination of the liberated carbon disulfide according to Equation (2) is then repeated. However, the addition of water to the alcoholic solution causes a shift of the absorption peak to 285 millimicrons. Consequently, the equations for the thiuram sulfides utilize the absorbance at this wavelength.

Experimental Data

Apparatus. All of the absorption measurements reported in this paper were made on a Beckman Model DU Spectrophotometer using quartz cells having a light path of 1.000 cm.

Reagents. The reagents used were: ethanol (ordinary 95%); phosphoric acid (Baker's 85% solution); dimethylamine (Naugatuck Chemical Co.'s 40% solution), and sodium hydrogen sulfite (Baker and Adamson, purified).

Purification of the Accelerators. Technical grade commercial accelerators were purified in the following manner:

(1) The accelerator was taken into solution with hot benzene until the benzene solution became saturated.

(2) Ethyl alcohol was added until precipitation began.

(3) The solution was allowed to cool and the precipitate was removed by filtration using a Buchner funnel.

(4) The precipitate was recrystallized from hot alcohol and dried to remove the last traces of benzene.

Procedure. The experimental procedure is as follows: An accurately weighed sample of exactly 0.5000 grams of thinly sheeted stock or cured foam rubber is placed in a 500 ml. three-necked, round-bottomed flask. For thinly sheeted stocks, it is advisable to shake overnight. For foam stocks, it is only necessary to tear the stock into pieces approximately ⅛-inch in diameter. The analysis can then be run immediately. A few boiling chips, 400 ml. of 95% ethanol, and one ml. of concentrated (85%) phosphoric acid are added. Distillation at the rate of 3 to 4 ml. per minute is carried out using a Glas-Col heating mantle.

The receiver is a 250 ml. volumetric flask containing five ml. of a 5% dimethylamine solution (aqueous) and 15 ml. of 95% ethanol. An adapter which extends to the bottom of the volumetric flask should be used. The receiving flask should be placed in such a position that it can be lowered as the distillation proceeds. In this way, the adapter can be kept slightly below the level of the distillate at all times.

When the distillate has reached a total volume of 250 ml., the contents are mixed thoroughly and the absorbance of the distillate at 287 millimicrons using 95% ethanol in the blank cell measured. The per cent dithiocarbamate accelerator is calculated from Equations 6 to 10, inclusive.

The residue is then neutralized with 100 ml. of a 0.1 N sodium hydroxide solution. A solution of 0.100 g. of sodium hydrogen sulfite in 100 ml. of water and 50 ml. of 95% ethanol are added and the distillation repeated. As previously mentioned, the per cent thiuram sulfide accelerator is determined using the absorbance at 285 millimicrons. The equations for this determination are 11, 12, and 13.

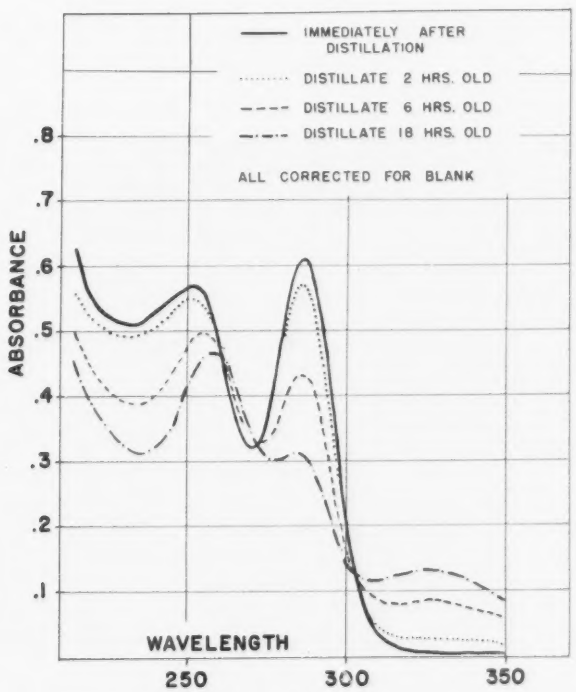

Figure 2—Stability of distillate.

Development of Equations

The per cent accelerator is given by:

$$\% \text{ accelerator} = \frac{100\ AC}{\text{Weight of sample in grams}} \quad (5)$$

where A is the absorbance at the point of maximum absorption and C is the concentration in grams of accelerator per 250 ml. of distillate required to give a value of 1.000 for A.

If the sample weight is always taken as exactly 0.5000 grams, the equations for the accelerators involved in this investigation are as follows:

% Methazate (zinc dimethyldithiocarbamate)	= 0.55 (Absorbance at 287 mμ)	(6)
% Ethazate (zinc diethyldithiocarbamate)	= 0.65 (Absorbance at 287 mμ)	(7)
% Butazate (zinc dibutyldithiocarbamate)	= 0.85 (Absorbance at 287 mμ)	(8)
% Arazate (zinc dibenzyldithiocarbamate)	= 1.10 (Absorbance at 287 mμ)	(9)
% Pipazate (zinc N-pentamethylene dithiocarbamate)	= 0.69 (Absorbance at 287 mμ)	(10)
% Tuex (Tetramethyl thiuram disulfide)	= 0.438 (Absorbance at 285 mμ)	(11)
% Ethyl Tuex (Tetraethyl thiuram disulfide)	= 0.586 (Absorbance at 285 mμ)	(12)
% Monex (Tetramethyl thiuram sulfide)	= 0.750 (Absorbance at 285 mμ)	(13)

Note: The values for "C" and thus the final equations should be determined for each instrument to be used. The values listed were obtained with a Beckman Model DU Spectrophotometer using 1.000 cm. quartz cells. The slit widths were 0.875 mm. at 287 millimicrons for Equations 6 through 10 and 0.905 mm. at 285 millimicrons for Equations 11 through 13.

Results

The results obtained with pure samples of the various dithiocarbamate accelerators were as follows:

Dithiocarbamate	Mg taken	Mg found	% Recovery	% Error
Methazate	3.88	3.95	101.8	1.8
	3.88	3.93	101.3	1.3
Ethazate	3.80	3.72	97.9	2.1
	3.80	3.75	98.7	1.3
Butazate	5.80	5.89	101.6	1.6
	5.80	5.86	101.0	1.0
Arazate	6.68	6.62	99.1	0.9
	6.68	6.51	97.5	2.5
Pipazate	4.74	4.72	99.6	0.4
	4.74	4.80	101.3	1.3
			Average	1.4%

RESULTS OF ANALYSES OF RUBBER STOCKS CONTAINING UNKNOWN AMOUNTS OF ACCELERATORS

Stock	Accelerator	% Found	Deviation	% Deviation
A	Ethazate	0.41	0.00	0.0
		0.41	0.00	0.0
		0.41	0.00	0.0
		0.40	0.01	2.5
		0.41	0.0025	0.6
B	Ethazate	0.17	0.005	3.0
		0.16	0.005	3.0
		0.165	0.005	3.0
C	Ethazate	0.11	0.00	0.0
		0.11	0.00	0.0
		0.11	0.00	0.0
Latex Film A	Ethazate	0.60	0.00	0.0
		0.60	0.00	0.0
		0.60	0.00	0.0
Latex Film B	Ethazate	0.01	0.00	0.0
		0.01	0.00	0.0
		0.01	0.00	0.0
Butyl Stock A	Ethazate	0.26	0.005	1.9
		0.25	0.005	1.9
		0.255	0.005	1.9
Foam Stock A	Methazate	0.32	0.01	3.2
		0.30	0.01	3.2
		0.31	0.01	3.2
Foam Stock B	Methazate	0.97	0.025	2.6
		0.92	0.025	2.6
		0.945	0.025	2.6
Foam Stock C	Methazate	0.51	0.015	3.0
		0.48	0.015	3.0
		0.495	0.015	3.0
D	Monex	0.076	0.00	0.0
		0.076	0.00	0.0
		0.076	0.00	0.0
E	Monex	0.100	0.00	0.0
		0.100	0.00	0.0
		0.100	0.00	0.0

The results of analyses carried out with pure samples of the thiuram sulfide accelerators were as follows:

Thiuram Sulfide	Mg taken	Mg found	% Recovery	% Error
Tuex	2.50	2.50	100.0	0.0
	2.50	2.49	99.6	0.4
	2.50	2.51	100.4	0.4
	2.50	2.50	100.0	0.0
	2.50	2.48	99.2	0.8
Ethyl Tuex	3.00	2.99	99.7	0.3
	3.00	2.99	99.7	0.3
	3.00	3.03	101.0	1.0
	3.00	2.99	99.7	0.3
	3.00	3.01	100.3	0.3
Monex	5.78	5.81	100.5	0.5
	4.80	4.86	101.2	1.2
	5.03	5.18	103.0	3.0
	4.93	4.80	97.4	2.6
			Average	0.8%
Butazate plus Tuex	5.00 Butazate	4.96	99.2	0.8
	2.34 Tuex	2.33	99.5	0.5

The results obtained when the method was applied to various rubber stocks containing unknown amounts of accelerators are shown in the accompanying table. The entire absorption spectrum for a distillate from Sample A was measured immediately after distillation and at 2, 6 and 18 hours after distillation. The spectra are shown in Figure 2.

Since the distillate from a sample of pure Ethazate was stable (Figure 1), there seems to be some active component in the distillate from cured rubber which makes the dithiocarbamate in the distillate unstable. On the basis of the information in Figure 2, it is imperative that the absorption measurements be made immediately after distillation.

Summary

A spectrophotometric method of analysis for dithiocarbamate and thiuram sulfide accelerators in rubber stocks has been developed. The method is simple and shows an accuracy of better than ± 2% for the pure accelerators and a precision of better than ± 1% for the accelerators in rubber stocks.

ACKNOWLEDGMENT

The authors are indebted to Jacob Tolsma and E. R. Schreiber for carrying out much of the experimental work reported herein.

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How Rempel Manufacturing Co. increased production capacity by 400 per cent through installation of

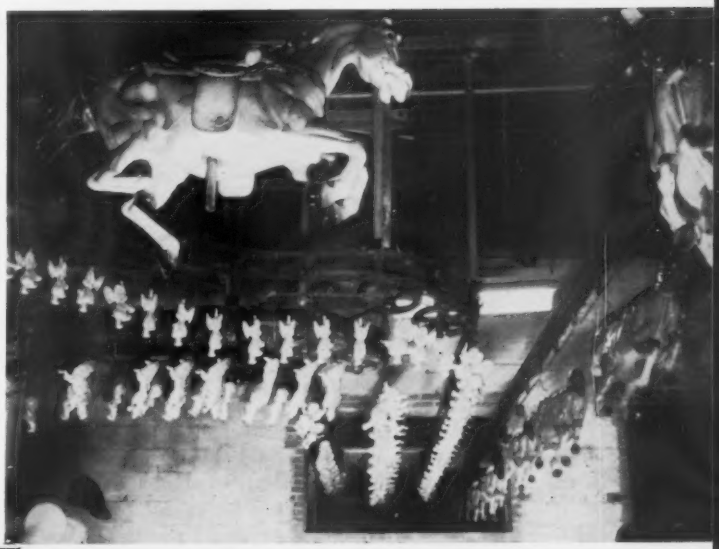
Overhead Conveyor Lines

for handling latex toys

An overhead conveyor system carries toys from production, to urethane dipping stations, into an overhead oven and then to finishing areas

NEARLY one-quarter mile of overhead conveyor lines has increased the output of the country's largest hollow latex-toy manufacturer by 400 per cent. Since installation of the lines, an average of 51,000 toys are processed daily at the plant of the Rempel Manufacturing Co. of Akron, Ohio. The equipment was made by Rapistan-Keystone Co., Inc., of Detroit, Mich., an affiliate of the Rapids-Standard Co., Inc., of Grand Rapids, Mich.

When urethane coating was introduced into the Rempel manufacturing process, a system had to be devised to carry the toys from the production area, to the dipping stations, into an overhead baking oven, and to the final production sections. The overhead conveyor-like system selected is a deviation from the process formerly used at Rempel, when the toys were colored by the use of individually operated sprays. With the urethane coating process, the installation of four conveyors was necessary to move the toys through the dipping sections and into the overhead baking oven where they remain for 30 minutes at temperatures up to 200°F. The conveyors then transport the toys to the final sections of production—the whistle insertion, inspection and packaging areas.



Four conveyor lines converge at the oven and the dipped toys move in without mishap. Hanging toys do not brush against one another on 90 degree turns — an important space and production factor.

Molded toys move from the production center of the Rempel plant by conveyor belt to the urethane dipping station. After being dipped, they are hung on a conveyor line to be carried to the baking oven.

The conveyor system must carry 30 different items at Rempel, the largest of which is a hollow hobby horse, 32½-inches long, 19-inches high and 7½-inches wide. Other items include a rocking giraffe, 24-inches high on its frame, and many different dolls and animals of varying sizes. These toys are suspended from the conveyor on specially constructed racks that allow them to be moved without touching each other.

Even with the disadvantage of uneven floors and ceil-

The overhead conveyor system also transports the toys out of the oven to other processing points, such as the whistle insertion station. Ease of handling is another aid to production capacity.

ings at Rempel, installation of the conveyor was easily accomplished. Line one has six changes in elevation, line two has eight, line three has six, as does line four. The four units have an 18-inch drive sprocket, a 285-pound chain pull and a speed range from 2.3 to 6.9 feet per minute.

Three sides of the overhead oven were installed first, and before the base was laid, the conveying equipment was placed. The four lines enter the oven, loop, and emerge from two exit points and travel to the final production section. Each line has six turning wheels within the oven. The lines have trolleys spaced at 12-inch centers and load carriers at 24-inch centers. Because nearly all of the toys are small and hollow, most of the lines can operate at maximum capacity at all times.

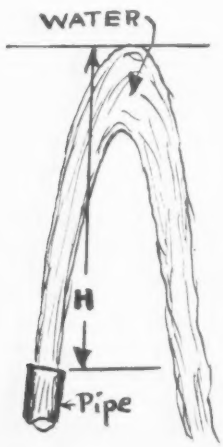
Maintenance-wise, the Rapistan equipment is reported to have been no problem. The lines operate at an average of 3 feet per minute, with each line being controlled independently of the other three, permitting variable speeds necessary in the processing of the different items. The lines maintain an average of 1,600 items in the air at all times.

The recently developed urethane coating process provides the toys with a shiny finish and protects them from deleterious effects of repeated washing. Formerly, the painted toys faded, and suffered under washing. The Rempel Co. is the first toy manufacturer to coat its toys with urethane.

Rempel plant engineer Frank Carillon reports that a thorough study was made of all types of systems before finalizing upon Rapistan as the best available. The primary concern regarding the effectiveness of the equipment in operation revolved around the effect of the gas oven, where the coatings are baked. Graphalloy-bushed traction wheels in the trolley have functioned perfectly in this location, however. There are 100 feet of track within the gas fired oven, and six wheels. This area, the most sensitive of all, has proven the Rapistan conveyor lines to be an unqualified success, according to Mr. Carillon, who states that creation of a urethane coating department would not have been possible without them.

How to Find the Rate of Flow through a Hose

A SIMPLE and dependable way to determine the rate of flow of water or any other liquid through a hose pipe fitting, or whatever it may be, is indicated in the accompanying sketch. The laws of falling bodies tell us the exact velocity of a body falling through the distance H. That same velocity must exist at the end of the pipe in order to throw the liquid up to the height H. Therefore, if one knows the height H and the internal diameter of the end of the pipe, it is easy to determine the flow.



Obviously, if the internal cross-sectional area of the end of the pipe in square feet is multiplied by the velocity of the liquid in feet per second, the answer will be the cubic feet of liquid flowing per second. The following simple rule results: Multiply the square root of the height H in inches by the square of the internal diameter of the pipe in inches and then multiply that product by 5.75. The result is the number of gallons flowing per minute.

For example, if the height H is 16 inches and the diameter is ½ inch, one multiplies 4 × ½ × ½ × 5.75, which gives 5.75 gallons per minute. W.F.S.

Studies of

GRAFT COPOLYMERS

A study of copolymers isolated from grafts of methyl methacrylate and acrylamide on polybutadiene; evaluation as elastomeric materials

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Graft polymers have been prepared by introducing polymerization initiating species onto a polybutadiene substrate. This was achieved by passing an oxygen/ozone mixture through the polybutadiene latex. Homopolymer formation was prevented by addition of a suitable reducing agent. Surface-active fractions were isolated from grafts of methyl methacrylate and acrylamide on polybutadiene. Evidence for the formation of such graft copolymers is presented.

GRAFT copolymers have received a great deal of attention during recent years. The reasons for the active interest in this new field have been discussed in numerous publications *(1, 2, 3)* and will not be reviewed in this paper. That interesting properties can be obtained with a non-random molecular structure is well known and has been demonstrated in the current investigation.

The various methods reported in the literature for the preparation of graft copolymers, however, had either certain inherent disadvantages, or else were not considered to be adaptable to commercial operation. The principal advantage of the techniques which have been described *(1, 3, 4, 5)*, aside from equipment problems, is the concomitant production of homopolymer. The technique described by Mark *(6)* suffers from the disadvantage of being conducted in solution.

A new, more advantageous approach towards the preparation of graft copolymers, first investigated in these laboratories *(7)*, has been applied and further developed in this work. The method consists simply in passing oxygen or oxygen/ozone mixtures through a latex, thereby forming reactive sites, presumably of a peroxidic type, along the polymeric chain. On subsequent addition of a second monomer, polymerization is initiated at these reactive sites and the graft copolymer is thus formed. This technique also suffers from the production of some homopolymer. One of the purposes of the present investigation was to eliminate this homopolymer formation. Some of the properties of the grafted products are presented and discussed.

Experimental Methods

Throughout the work, grafting has been confined to polybutadiene as the "backbone" since it has been shown *(7)* to be much more susceptible than styrene to the oxidation treatment. Peroxide groups are presumably formed at the double bond or by reaction with the α-methylenic hydrogen. Vinyl acetate, methyl methacrylate and acrylamide were chosen for the grafted side chains because their marked difference in solubility compared with that of butadiene was thought to offer possibilities of interesting properties, including surface activity *(8, 9, 10)*.

In the experiments with liquid polymers, the oxygen/ozone mixture was introduced through a fritted glass tube. In experiments on latex, the fritted glass tube was replaced by a 2-inch length of perforated polyethylene tubing. A new piece of tubing was used for each experiment. The amount of ozone supplied by the generator was determined by iodometric titration *(11, 12)* and found to be 0.227 g. ozone per hour. The ozone output was linear with time. Nitrogen was always passed through the latex or soap solution, after completion of the oxygen/ozone treatment.

Surface tension measurements were performed with a Cenco DuNouy Tensiometer No. 70545. The viscosities of the polybutadiene-styrene-benzene solutions were determined using a Brookfield synchro-electric viscometer, multi-speed, Model LVT No. 8123. Vistex viscosities were measured with a modified Ubbelohde viscometer *(13)*. The solvent was a mixture of toluene and isopropanol in a volume ratio of 80/20. Extractions of the graft copolymers were carried out with the conventional Soxhlet apparatus.

Results

Preliminary experiments were carried out using a low molecular weight liquid copolymer of butadiene and styrene as the "backbone". The polymer was prepared in a five-gallon reaction vessel using a conventional recipe based on a butadiene-styrene charge ratio of 72/28 by weight, and employing 20 g. of mercaptan modifier per 100 g. monomer. Polymerization temperature was 12.8°C.

One portion of this liquid copolymer was treated by passing an oxygen/ozone mixture through it for three hours and the other portion was treated similarly with

Note: This article is based on a paper presented before the Seventh Canadian High Polymer Forum, Sarnia, Ontario, Canada, November 8-9, 1956.

TABLE I—POLYMERIZATION RECIPES

	Recipe 1 (parts by weight)	Recipe 2 (parts by weight)
Butadiene	100.0	——
Polybutadiene	——	38.6
Vinyl Acetate	——	61.4
Water	200.0	200.0*
Potassium fatty acid soap	4.7	4.7*
KCl	0.2	0.2*
MTM-4	0.2 or 5.0	0.2 or 5.0
DIP	0.22	——
$FeSO_4 \cdot 7H_2O$	0.01	0.01
Formopon	0.057	0.057
Sequestrene AA	0.012	0.012
Trisodium Phosphate	0.035	0.035
Benzene	2.2	1.1
Temperature	12.8°C.	12.8°C.

* Water, soap and non-polymerizable solids introduced into the system with the polybutadiene latex are included in the amounts shown in Recipe 2.

pure oxygen. Both samples were flushed with nitrogen and emulsified in water together with vinyl acetate or methyl methacrylate and the usual ingredients of a "cold" polymerization recipe.

Repeated experiments failed to produce any conversion in 48 hours reaction time. Since ozonides are known to form by applying this oxygen/ozone treatment to water-free rubber solutions *(14)* and to unsaturated low molecular weight compounds *(15, 16, 17, 18)*, it is presumed that the emulsification treatment caused hydrolysis of these ozonides via dihydroxyperoxides *(19)* to aldehydes or carboxylic acids. Attention was therefore diverted from the liquid polybutadiene starting material to a polybutadiene latex.

Two polybutadiene latices of different molecular weights were prepared by varying the mercaptan content according to Recipe 1, Table I.

Oxygen or oxygen/ozone was passed through 200 g. samples of both latices for 30 minutes and they were flushed with nitrogen for ten minutes. Vinyl acetate was then added in such a way that the polybutadiene/vinyl acetate molar ratio was 1:1 corresponding to a 38.6:61.4 weight ratio. Graft polymerization was attempted according to Recipe 2, Table I.

No conversion was observed in any experiment even in 30 hours. Since similar behavior of vinyl acetate towards polymeric peroxides has been observed by other workers in the field *(20)*, it was not considered fruitful to examine this monomer further.

Recipe 1 was slightly modified to contain only 150 parts water. Oxidation for one hour or "ozonization" for 30 minutes was carried out on latex samples of 100 g. Recipe 2, modified by the substitution of methyl methacrylate or acrylamide for vinyl acetate, yielded high conversions in 17 to 20 hours. No activator was used in the preparation of the acrylamide samples on ozonized latex, i.e., Samples 3, 4, 11 and 12 (Tables II and III). The results for all experiments are listed in Tables II and III and correspond to a 1:1 molar charge ratio for polybutadiene and monomer.

The consistently higher conversions observed in the experiments with the high mercaptan charge in Recipe 2

TABLE II—LOW MOLECULAR WEIGHT POLYBUTADIENE POLYMERS GRAFTED WITH METHYL METHACRYLATE AND ACRYLAMIDE IN A MOLAR RATIO 1:1

	Ozonized Polybutadiene Latex				Oxidized Polybutadiene Latex			
Grafted Chain	Methyl Methacrylate		Acrylamide		Methyl Methacrylate		Acrylamide	
Sample No.	1	2	3	4	5	6	7	8
Parts MTM-4 in Recipe 2	0.2	5.0	0.2	5.0	0.2	5.0	0.2	5.0
% Conversion	98.6	100.0	98.6	100.0	98.4	100.0	88.1	97.9
Reaction Time (hours)	18.0	18.0	18.0	18.0	17.0	17.0	18.0	18.0

are most likely due to a higher homopolymer fraction formed by the reaction

$$RSH + ROOH \longrightarrow RS^* + H^+ + RO^* + OH^-$$

where the RS* free radical is the source of homopolymerization. The data in Tables II and III show a slightly higher conversion when the second monomer is grafted onto an ozonized substrate, but the differences between the ozone and oxygen treatments is negligible for these monomers.

In another series of experiments, graft polymers were prepared in a similar manner using a molar charge ratio of butadiene to second monomer (methyl methacrylate or acrylamide) of 1:2. Recipe 1 for the polybutadiene preparation was again modified slightly to include a water charge of 180 parts and by the substitution of Nacconol NRSF for the potassium fatty acid soap. The resulting latex was treated in the usual way for 30 minutes with a mixture of oxygen and ozone prior to carrying out the graft polymerization according to Recipe 2. The results of this series of experiments are tabulated in Table IV.

All graft copolymers obtained in this series had a hard resinous appearance and a negligible water-soluble fraction. This was attributed to the high plastic content corresponding to the charge ratio and further evaluation was not attempted.

Since the polymers described in Tables II and III were presumed to be grafts of a hydrophylic chain on an oil-soluble backbone, a study was made of their surface activities. A portion of each latex could not be precipitated by a normal methanol coagulation and in

TABLE III—HIGH MOLECULAR WEIGHT POLYBUTADIENE POLYMERS GRAFTED WITH METHYL METHACRYLATE AND ACRYLAMIDE IN A MOLAR RATIO 1:1

	Ozonized Polybutadiene Latex				Oxidized Polybutadiene Latex			
Grafted Chain	Methyl Methacrylate		Acrylamide		Methyl Methacrylate		Acrylamide	
Sample No.	9	10	11	12	13	14	15	16
Parts MTM-4 in Recipe 2	0.2	5.0	0.2	5.0	0.2	5.0	0.2	5.0
% Conversion	90.0	92.3	84.6	89.3	79.0	83.2	64.8	67.8
Reaction Time (hours)	18.0	18.0	20.0	20.0	24.0	18.0	20.0	20.0

TABLE IV — POLYBUTADIENE GRAFT POLYMERS OF METHYL METHACRYLATE AND ACRYLAMIDE IN A MOLAR RATIO 1:2

Grafted Chain	Ozonized Low Molecular Weight Polybutadiene — Methyl Methacrylate		Acrylamide		Ozonized High Molecular Weight Polybutadiene — Methyl Methacrylate		Acrylamide	
Sample No.	17	18	19	20	21	22	23	24
Parts MTM-4 in Recipe 2	0.2	5.0	0.2	5.0	0.2	5.0	0.2	5.0
% Conversion	92.6	84.8	100.0	100.0	97.2	100.0	69.4	74.7
Reaction Time (hours)	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0

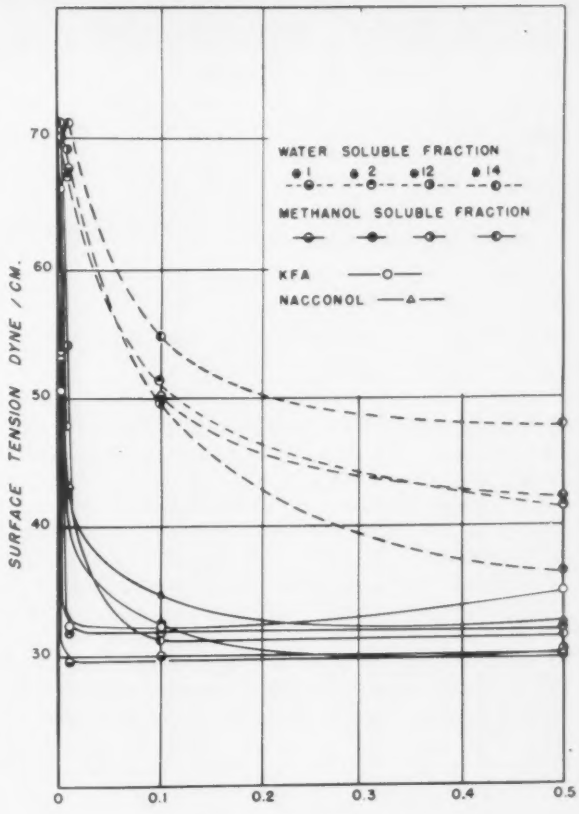
addition it was observed that a portion of the coagulated polymer could be redissolved by treatment with boiling water. These two soluble portions were purified of original soap by a barium chloride treatment and were then vacuum dried at room temperature. Surface tension measurements were made on the soluble portions of Samples 1, 2, 12 and 15 and the results are shown in Table V and the accompanying illustration.

The surface tension of pure water was determined to be 71.48 dyn/cm. at 25°C. compared with the literature value *(21)* of 71.97 dyn/cm. Measurements on potassium fatty acid and Nacconol NRSF are included for comparison. All values represent the average of three separate measurements.

It is interesting to compare the results in Table V with the behavior of a commercial product *(8)* reported to contain one hydrophylic group for each hydrocarbon side chain. Results for these materials are shown below:

Trade Name	% Concentration	Surface Tension dyn/cm.
AK-534	0.3	70
AK-534	1.0	68
AK-534	10.0	64
AK-563	1.0	67

Since the data of Tables II and III indicate that some of these graft copolymers contained water-soluble fractions showing surface tensions as low as those of Nacconol and potassium fatty acid soap, it was thought likely that these graft copolymers might be sufficiently surface active to support polymerization. Evaluation was therefore made in a conventional "cold" recipe (12.8°C.) using a 50/50 butadiene/styrene charge and sodium formaldehyde sulfoxylate activation and in a high temperature (65°C.) recipe using a 40/60 butadiene/styrene charge and persulfate activation. In all cases the graft copolymers supported polymerization in the absence of other emulsifiers. The results are shown in Table VI.



Surface tension data for graft polymers

The methyl methacrylate graft copolymers (Nos. 1 and 6) show a slight margin of conversion over the acrylamide graft copolymers (Nos. 7 and 8) in the "cold" recipe. There is also a marked increase in conversion for the graft copolymers containing long side chains (Nos. 1 and 7) compared with the grafts containing relatively short chains (Nos. 6 and 8). These latter polymers also produced unsatisfactory latices which contained large amounts of coagulum.

The success of these experiments in producing graft copolymers which support emulsion polymerization suggested the production of a graft copolymer of sodium acrylate on polybutadiene. The large difference in polarity between the backbone and the side chain in this system could be expected to produce a copolymer with very strong surface active properties. The system presented certain experimental problems in the selection of a suitable emulsifier which would prevent coagulation on addition of sodium acrylate.

TABLE V — SURFACE TENSION MEASUREMENTS IN DYN/CM. AT 25°C.

% Conc.	Potassium Fatty Acid	Nacconal NRSF	Water-Soluble Fractions 15	12	1	2	Alcohol-Soluble Fractions 15	12	1	2
0.001	50.8	49.9	71.4	70.1	71.4	70.4	66.3	70.6	53.1	53.8
0.010	32.5	43.3	71.4	69.4	67.8	67.2	48.0	54.4	29.9	32.2
0.100	32.4	34.9	54.8	49.8	50.1	51.5	31.4	32.5	30.4	32.2
0.500	35.0	32.9	48.0	36.1	42.3	41.8	31.8	30.2	30.3	32.1

TABLE VI—ABILITY OF GRAFT COPOLYMERS TO SUPPORT POLYMERIZATION

Polymerization Temperature	Emulsifier	% Conversion (18 hrs.)	Remarks
12.8°C.	Nacconol NRSF	98.5	
	Graft No. 1	89.9	
	Graft No. 7	80.6	
	Graft No. 6	52.0	Coagulum
	Graft No. 8	37.3	Coagulum
65°C.	Graft No. 1	71.4	
	Graft No. 5	65.8	

These problems were finally resolved by the use of Antarox A-403 in place of potassium fatty acid soap in Recipe 1 and by use of a water charge of 180 parts. Using a polybutadiene prepared in this manner and ozonizing it in the usual way, it was possible to produce a graft copolymer with sodium acrylate in a recipe similar to Recipe 2. This graft copolymer showed similar characteristics of alcohol and water solubility, and after purification to remove the residual emulsifier it was used to support polymerization in a high temperature recipe run at 65°C. using persulfate activation. A conversion of 19.2% was achieved in 20 hours. These results left little doubt that graft copolymers may be successfully prepared by the reaction of a second monomer in the presence of a polybutadiene latex treated with oxygen or an oxygen/ozone mixture.

Additional Considerations

Two further aspects of the problem required attention: (1) It was desirable to study the nature of the reaction of oxygen or ozone with the polymeric backbone in order to determine the location of the polymerization initiating site, and (2) Additional proof of the presence of a graft copolymer was desired.

The first of these aspects was approached by a study of the influence of ozone on some of the components of the polymerization recipe. An experiment was performed in which the soap solution (Nacconol NRSF) was subjected to the oxygen/ozone treatment in the usual manner and then added to the remainder of the polymerization ingredients. No catalyst was added but in the presence of monomer and sodium formaldehyde sulfoxylate activator, styrene polymerized to 100% conversion in 17 hours at 12.8°C. A very sensitive test for hydrogen peroxide capable of detecting 0.5 parts/million *(22)* showed the complete absence of this chemical from the system. It was presumed therefore that the soap was the species which carried the polymerization initiating group. This assumption was verified by an experiment in which the water was ozonized in the normal way and subsequently used in a polymerization recipe. There was no detectable polymerization of styrene in 24 hours.

From these experiments it is apparent that the soap is one of the ingredients in which the ozonization treatment produces a polymerization initiating species. This makes the production of homopolymer possible but gives no indication of the possibility of graft polymerization, which can only occur if the polymerization initiating species is attached to the backbone polymer.

An effort was made therefore to destroy the water-soluble initiating species selectively in an ozonized latex without destroying any polymeric initiator which might be present. The addition of water-soluble reducing agents such as polyamines *(23)* and ferrous sulfate seemed worthy of test in this regard. The first experiment on the soap solution was therefore repeated but the ozonized soap solution was treated with ten parts triethylene tetramine for 15 minutes prior to the addition of monomer and activator. Only 9.6% conversion of styrene could be observed after 18 hours. If the ozonized soap solution were treated with 0.4 parts ferrous sulfate-Sequestrene AA-TSP solution prior to addition on monomer and activator, there was no detectable conversion after 18 hours.

Since this treatment with reducing agents could destroy essentially all of the water-soluble initiating species, a parallel experiment was next performed on ozonized polybutadiene latex. A latex produced in Recipe 1 and treated with oxygen/ozone was mixed with ten parts triethylene tetramine prior to polymerization of styrene. A polymerization of 44.6% was achieved, which is considerably higher than the 9.6% conversion reported in the soap experiment.

In a similar experiment using styrene and ferrous sulfate Sequestrene AA-TSP in place of triethylene tetramine, 100% polymerization of the second monomer was achieved in 18 hours. (The presence of a chelating compound such as Sequestrene AA in the ferrous iron reducer is necessitated by the fact that considerable amounts of polybutadiene are coagulated by the addition of non-complexed ferrous sulfate solution to the latex. Other sequestering agents are equally acceptable.)

These experiments give a clear indication that the oxygen/ozone treatment produces polymerization-initiating species both on the backbone polymer and on the soap. The indication is also clear that the latter initiating species can be essentially or totally destroyed by the addition of a suitable reducing agent.

It could be inferred from the polymerization experiments reported herein that graft copolymers have been successfully prepared on a polybutadiene starting mate-

TABLE VII — BROOKFIELD VISCOSITIES (IN CPS) OF POLYBUTADIENE SOLUTIONS

RPM	60	30	12	6	3	1.5
Exp. 1—Ozonized polybutadiene plus styrene monomer	488	680	1050	1400	1880	2880
After 18 hours at 50°C.	120	150	150	160	170	170
Exp. 2—Non-ozonized polybutadiene plus styrene monomer	900	925	925	950	1000	1000
After 18 hours at 50°C.	978	1024	1030	1050	1120	1200
Exp. 3—Ozonized polybutadiene plus polystyrene	2390	4000	8600	14000	23000	35200
After 18 hours at 50°C.	2530	4260	9350	17300	23000	42000

rial. More direct physical evidence of this fact was desirable, however. Two polymers were therefore tested in the following manner: Both were prepared from a charge of polybutadiene and methyl methacrylate in a weight ratio of 70/30; but in the polymerization of the first graft polymer, a reducing agent was added in the manner described above, whereas in the polymerization of the second graft polymer, no reducer was added. Both products were extracted with acetone for 48 hours. This treatment extracted 10% of the product which had been treated to remove the water-soluble initiator compared with 18% of the untreated product. The difference in extractable content is presumed to be polymethyl methacrylate whose polymerization was initiated by the ozonized soap.

A more conclusive test for the presence of a graft copolymer has been developed in these laboratories and described in more detail elsewhere *(24)*. The test consists of the addition of iodine monochloride to a solution of the copolymer. It has been established that polybutadiene and butadiene/styrene random copolymers containing up to 40% styrene precipitate quantitatively under this treatment. Copolymers containing between 40 and 70% styrene precipitate as colloids. Only those copolymers containing more than 70% styrene in random distribution remain in solution after the iodine monochloride treatment.

A graft copolymer containing a calculated 30.4% styrene was titrated with iodine monochloride in the appropriate manner. The iodine monochloride required for the titration corresponded to a butadiene content of 70.6%. This is equivalent to a styrene content of 29.4%, which is in excellent agreement with the calculated value. In spite of the low bound styrene of this copolymer, there was no detectable precipitate after the iodine monochloride treatment. This is taken as conclusive proof of the absence of polybutadiene from the solution and of the presence of styrene in graft form.

The well-known influence of side chains in reducing the viscosity of a polymer solution provided an additional method of testing for the existence of grafted side chains in these polymers. A series of experiments was therefore performed on a polybutadiene latex in the following manner: In the first experiment a polybutadiene latex was ozonized for 45 minutes, coagulated in methanol, filtered, blotted dry and dissolved in benzene to a 5% solution. Twenty grams of styrene-monomer were added to 200 g. of this solution and the Brookfield viscosity was measured. A second viscosity measurement was made after heating the solution for 18 hours at 50°C.

In the second experiment the procedure was identical but with the elimination of the ozone treatment. The results of these two experiments were compared with the Brookfield viscosity measurements of a mixture of polybutadiene and polystyrene solutions. The results are shown in Table VII.

In Experiment 1 the Brookfield viscosity is observed to decrease markedly as a result of the polymerization of the styrene at 50°C. Since there is no reason to suspect degradation of the polybutadiene under these conditions, this reduction in viscosity is taken as evidence of the production of a branched structure due to grafting of the styrene onto the ozonized polybutadiene backbone.

TABLE VIII—EVALUATION OF GRAFT COPOLYMERS AS ELASTOMERIC MATERIALS

Sample	Cure Time (Min.)	Tensile Strength (psi)	% Elongation
Polybutadiene	12.5	337	60
	20.0	362	80
	40.0	375	65
Butadiene/Acrylamide	12.5	498	70
80/20	20.0	605	70
	40.0	562	70
Butadiene/Acrylamide	12.5	498	70
70/30	20.0	555	80
	40.0	631	80
Butadiene/Methyl methacrylate	12.5	725	30
80/20	20.0	1210	70
	40.0	1260	70
Butadiene/Methyl methacrylate 70/30	No cure possible		
Butadiene/Styrene	12.5	1030	120
80/20	25.0	1020	105
	40.0	1030	95

In Experiment 2 there is a slight increase in viscosity which may be due to polymerization of the styrene or to small losses of solvent by evaporation. The starting viscosities in Experiment 3 are considerably higher than those in Experiment 2 by virtue of the presence of 20 g. of polystyrene in place of styrene monomer. The slight increase in Brookfield viscosity is presumed to be due to solvent evaporation. The results give additional confirmation of the graft polymerization of styrene on the ozonized polybutadiene samples.

Evaluation as Elastomeric Materials

As the final phase of this work, it was decided to do a preliminary evaluation of these graft copolymers as elastomeric materials. The original polybutadiene starting material and grafts of methyl methacrylate and acrylamide in 80/20 and 70/30 charge ratios and of styrene in an 80/20 charge ratio were therefore prepared. These samples were compounded in the following recipe:

	Parts
Polymer	100.0
Furnex	50.0
NBS stearic acid	0.5
NBS ZnO	3.0
NBS sulfur	1.5
Altax	1.0

Each compound was prepared with 5 g. polymer and cured at 307°F. for the times indicated in Table VIII. Prior to compounding, these samples were treated with 6% of a 25% emulsion of BLE (a condensation product of diphenyl amine and acetone) as antioxidant. The physical properties are shown in Table VIII.

Considerable improvement in tensile strength and elongation is observed for some of these graft polymers compared with the original starting material. These results are only preliminary and a more detailed investigation of the influence of grafted side chains on processing characteristics and physical properties is now under way.

Summary

By treating a polybutadiene latex with an oxygen/ozone mixture, reactive sites have been introduced along the polymer chains which are capable of initiating the polymerization of methyl methacrylate, acrylamide or styrene. Homopolymer formation has been shown to arise from the soap molecules and has been successfully suppressed or prevented by addition of a water-soluble reducing agent prior to the addition of the second monomer. This treatment does not affect the oil-soluble polymeric peroxides on which grafting then occurs. Graft polymers were prepared in this way, some of which show surface activity and, as the sole emulsifier, are capable of supporting polymerization. That graft copolymers are indeed produced is demonstrated by extraction and viscosity studies as well as iodine monochloride titration of a graft polymer solution.

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By LEV AKOBJANOFF

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THE following is a description of a new class of compounds obtained by reaction of massive doses of halides of S(Se, Te) with organic molecules containing two or more unsaturated components. It has been known for some time that the above reagents cross-link to condensates of molecular weights, increasing proportionally with the amounts of halides used. It was not known until this work that this condensation has a peak. Our investigation has shown that amounts of halides exceeding certain well defined proportions result in compounds of new properties. Most striking among these properties is the rapid decline of viscosity. An appropriate designation for these new compounds, located beyond the peak of gelation possible for the substances used, seems "transgel condensates of unsaturated compounds."

History

The reaction of sulfur chlorides resulting in direct binding of S to an organic molecule was discovered by Rochleder in 1849. It has found technical applications, e.g., in making viscous non-penetrating oils for paints by thickening with up to 7% of sulfur chloride, in highly condensed elastic rubber substitutes from the same oils with some 30% of sulfur chloride, and in so-called cold vulcanization, where 1% or less of sulfur chloride reacting with rubber produces the elastic state of this material.

In certain cases proportions of sulfur chlorides and unsaturated groups as high as 1:1 have been used in the past and it has been found that such amounts of reagents yield thiochlorides Cl•R•S_m•Cl *(1)*. Since the structure of sulfur chlorides is known to be Cl•S•Cl and Cl•SS•Cl *(2)*, in thiochlorides •SCl and •SSCl must be unilaterally bound to R, yielding endstanding chlorines capable of reactions, for example, with unsaturated substances. For organic monothiochlorides this has been demonstrated by various authors in the past, e.g., in reactions with acetone ethylene, cyclohexane, piperazine and water *(3)*. These Cl•R•S_m•Cl compounds obtained previously are not the same as the transgels of this investigation since in most of the experiments preceding ours only one •S_mCl group per R was introduced, the organic substance used being not receptive for more. Examples among many others are the Perchloro-methyl-mercaptan: Cl_3CSCl *(4)* or the Dichloro-methyl-sulfenyl-chloride: Cl_2CHSCl *(5)*.

In instances where butadiene, drying oils or rubber, which contain more than one double bond per molecule and are apt to add more than one sulfur chloride, were reacted, the employed amounts of S_2Cl_2 were insufficient even to neutralize the available unsaturation. Illustrative of this are the procedures of Calcott et al *(6)*, of Weber *(7)*, of Garvey *(8)* and of Herrmann and Haehnel *(9)*.

Of all previous investigators only Le Blanc and Kroeger *(10)* have treated rubber with sufficient amounts of S_2Cl_2 to obtain a reaction product similar to ours. On closer examination, however, one finds that they have worked under conditions at which the reactions could not have been complete. They observed gelation, whereas, as shown below, rubber sulfo-chloride solutions remain permanently liquid if treated correctly, even at concentrations higher than those of Le Blanc and Kroeger, who used 1% of rubber in organic solvents. Other examples are the partly vulcanized butyl rubber of Sparks et al *(11)*, which is far from being a transgel since it still contains double bonds capable of vulcanization, and the rubber sulfur chlorides of Bernstein *(12)*, which were incorrectly reacted and inadequately fractionated.

Polymerization and Reaction Proportion

Thus, the above investigators failed to show that the polymerization in these reactions attains a maximum for very definite proportions of the reactants and that amounts of S(Se, Te) halides exceeding these proportions produce lower consistencies, giving, for example, less and less viscous products in the measure as the proportions of the halide is increased. This phenomenon may be illustrated, for example, by the reaction of sulfur monochloride with arachidonic acid. The molecular weight of this acid is approximately 300; since its molecule contains from 5 to 6 double bonds, 30 grams of this acid correspond approximately to 0.55 equivalents of double bonds and 36 grams of S_2Cl_2 produce the maximum cross-linking or hardness of the condensate. Larger amounts of sulfur monochloride result in condensates having increasingly greater softness, as shown in Table I.

TABLE I—REACTION OF SULFUR MONOCHLORIDE IN VARYING PROPORTIONS WITH ARACHIDONIC ACID IN BENZENE (20% SOLUTION)

Gr. of S_2Cl_2 per 30 gr. of acid	8-10	12-20	22-30	32-36	38-46
Characteristics of products	Pasty	Brittle	Hard	Elastic	Plastic to Liquid

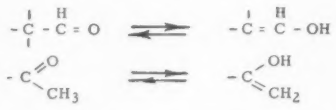
TABLE II—REACTIONS OF SULFUR DICHLORIDE IN VARYING PROPORTIONS WITH A Z-6 BODY SOYBEAN OIL DISSOLVED IN BENZENE

Gr. of SCl_2 per 125 gr. of oil	4	8	12	16	20	24	28	32	36
Time of gelation (minutes)	∞	36	1.5	2.5	65	270	420	800	∞

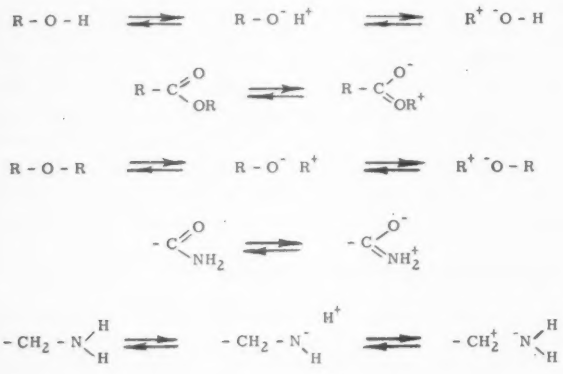
A further illustration of the same phenomenon is the reaction of a Z-6 body soybean oil with varying amounts of sulfur dichloride acting as a 20% aromatic solution. The results are given in Table II.

In additon to substances with double bonds transgels can be prepared from organic compounds containing triple bonds and other components unsaturated due to:

Enolization *(13, 14, 16, 18),*

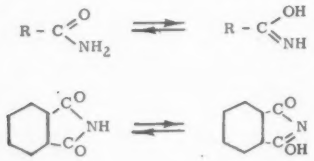


Resonance *(13, 14, 15, 16, 17, 18),* and



Branched chain paraffins, naphtalene, anthracene

Tautomerism *(13, 14, 16, 18).*



Various combinations of unsaturated constituents may be present, as long as at least two of them per molecule are available for the reaction. Some transgels prepared by us are listed in Table III.

The consistency of these products may vary from the fluidity of a middle oil to the plasticity of petrolatum, or even the elasticity of raw rubber, depending on the initial state of the starting material. In each instance, however, the final product will always be less viscous, more plastic, softer, lower melting or more soluble than the state observed at the maximum point of condensation which is obtained with smaller amounts of the halide.

Essential for the production of transgels is the use of halides of elements of the sulfur family, for example, S_2Br_2, SCl_2, SBr_2, S_2Cl_2, SCl_4, S_2I_2, S_2F_2, Se_2Cl_2, Se_2Br_2, $SeBr_4$, $SeCl_4$, $TeCl_4$, $TeBr_4$, and the others. Halides of other elements, for example, $AlCl_3$, PCl_3, $SiCl_4$, $SnCl_4$, $TiCl_4$, $ZnCl_2$, otherwise known as powerful catalysts of polymerization, do not yield transgel compounds with organic molecules containing two or more unsaturated groups.

The attainment of the transgel state can be ascertained readily by its chemical behavior, for instance, by boiling a sample with water, which reacts with a transgel, transforming it into a lightly colored spongy mass; SO_2 evolving at the same time indicates the destruction of free unilaterally bound halides, whereas completely cross-linked sulfur remains unchanged.

Function of the Solvent

The preparation of transgels may be carried out in the absence of a solvent medium. However, the use of a solvent for the organic compound reactant, or the halide, or both, has a marked influence on the rate of reaction and the properties of the resultant products. The solvent may be aromatic, such as benzene, toluene or xylene. Halogenated solvents such as carbon tetrachloride, chloroform and ethylene dichloride may be employed, with resultant lower rates of reaction than in the case of aromatic solvents. Aliphatic solvents such as naphtha and gasoline slow down the reaction markedly. Oxygen-containing solvents such as esters, ethers and ketones tend to react with the halide and may result in nullifying the desired reaction entirely. Combinations of various solvents may be employed in order to attain various reaction rates and degrees of condensation.

Since all the reactive groups of the organic radicals used for transgel condensation have been consumed, the obtained compounds may be stored for indefinite time without risk of self-condensation. On the other hand, because of only partial consumption of the halides, the principal chemical characteristic of transgels is the presence of unilaterally bound S(Se, Te) halide groups which are chemically further reactive and may be combined, e.g., with additional quantities of molecules having one or more unsaturated bonds. For example, the transgel resulting from the reaction of 100 grams of arachidonic acid with 220 grams of sulfur monochloride in 200 ml. of a chlorinated solvent such as carbon tetrachloride has been reacted with various types of compounds and produced cocondensates as follows:

Acetone	sticky oil
Acetylacetone	tough viscous mass
Diisobutylene	plastic mass
Divinylbenzene (40%)	plastic mass
Ether (diethyl)	hard mass
Furfuryl alcohol	hard mass
Glycol	hard mass
Glycol ethyl ether	tough plastic mass
Turpentine	plastic mass

Other cocondensates have been prepared using urea. For this a cold saturated solution of 100 grams urea in water was mixed with 660 grams of S_4Cl_2, prepared by

TABLE III—TRANSGELS RESULTING FROM REACTING 100 GRAMS OF UNSATURATED COMPOUNDS WITH 20% AROMATIC SOLUTIONS OF VARIOUS SULFUR CHLORIDES

Substance	Cause of Unsaturation	Amount of Chloride	Nature of Transgel
Acetyl Acetone (undiluted)	Enolization	32 gr. SCl_2	Red viscous liquid
Butyl Rubber (5% aromatic sol.)	Double bonds	16 gr. S_2Cl_2	Elastic, sticky
Cyclicized Rubber	Double bonds	120 gr. SCl_2	Hard, reddish grey
Glycol	Resonance	600 gr. S_2Cl_2	Yellow wax
Glycol Ethyl Ether (undiluted)	Resonance	16 gr. SCl_2	Yellow paste
Linoleic Acid (5% aromatic sol.)	Double bonds	32 gr. S_2Cl_2	Brown paste
Malonic Ester (undiluted)	Resonance	32 gr. SCl_2	Viscous liquid
Pale Crepe Rubber (5% aromatic sol.)	Double bonds	160 gr. S_2Cl_2	Hard, yellowish
Phenylene Diamine (fine powder)	Resonance	16 gr. SCl_2	Brown oil
Resorcinol (fine powder)	Resonance	64 gr. SCl_2	Brown viscous oil
Saccharose (fine powder)	Resonance	16 gr. SCl_2	Yellow viscous oil
Soybean Oil (undiluted)	Double bonds	200 gr. S_2Cl_2	Viscous black oil
Turpentine (undiluted)	Double bonds	128 gr. SCl_2	Yellow wax
Urea (aromatic suspension)	Resonance	16 gr. SCl_2	Yellow viscous oil
Urea (saturated aqueous solution)	Resonance	32 gr. S_2Cl_2 (undiluted)	Yellow paste

boiling for six hours 212 grams of S_2Cl_2 with 448 grams of elemental sulfur and 0.132 grams of elemental iodine. After standing for some time a bright yellow paste was obtained. Cocondensation by boiling at atmospheric pressure with various products resulted in:

Acetone	sticky mass
Methanol	yellow somewhat plastic mass
"Nonenes"	yellowish elastic mass
Urea (saturated aqueous solution)	hard mass
Water	light colored mass resistant to solvents

Soybean oil reacted as follows: treatment of 50 grams of the oil with 100 grams of sulfur monochloride produces instantaneous gelation. However, the product reliquefies spontaneously on standing (approximately 48 hours), yielding a viscous black oil which cocondensates with various substances. Ammonia yields a dull brown mass; glycerol gives a tacky product; glycol ethyl ether produces a tough tacky mass; pyridine cocondensates to a leatherlike substance; water reacts to rubberlike elastic masses of dull olive color.

Cocondensation opens avenues for practical uses of transgels. For example, we were able to develop transgel varnishes for rubber goods (natural and synthetic), which are elastic, extremely adhesive, glossy and resistant to wear. Being colorless, they can be used even on pastel shade stocks. Requiring no heat treatment and drying quickly, they can be applied by dipping, brushing, spraying to vulcanized goods. Other transgels can be used for bonding both unvulcanized and vulcanized rubber articles. Here again no heating is required and the strength of the seam is higher than the resistance of the material itself, even between heterogenous materials like natural rubber, styrene rubber and butyl rubber.

Conclusions

Physically the reaction products of organic molecules, containing more than one unsaturated component, with increasing amounts of halides of S(Se, Te), pass through the stage of maximum polymerization to a stage characterized by a lower degree of condensation, which we call "transgel." If carried out to the fullest extent, a transgel reaction will yield a product which will possess a degree of condensation substantially equal to the initial condition of the starting material. However, the process may be carried out to any point between the maximum condensation and the stage of complete transgel.

Chemically, as soon as the amount of halide reacted exceeds the proportion required for the maximum cross-linking, S(Se, Te) halide groups unilaterally bound to the organic radical are produced. With additonal amounts of unsaturated components these unilaterally bound halide groups further cross-link to cocondensates. Structurally maximum gelation corresponds to condensates $X_n \cdot R \cdot (Z_m)_n \cdot R \cdot X_n$ in which n (a whole number larger than one) exactly equals the equivalents of unsaturation in the original organic substance and all $(Z_m)_n$ groups are chemically neutralized by bilateral chemical binding. Transgel condensates will then have the formula $X_N \cdot R \cdot (Z_m X)_N$ in which R is an organic radical; Z represents S, Se or Te; m represents a whole number smaller than 5; X is a halogen, and N is a whole number greater than n.

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Use of neoprene as a VEHICLE FOR SEALANTS

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FIG. 1—Removing the caulking compound from its can so that it can be blended with an accelerator, seen in the jar.

THE dictionary defines "vehicle" as the medium in which gums, fillers, colors and other materials are dissolved and blended prior to thinning with a solvent to form a paint or putty. Since neoprene is a true elastomer, capable of wetting and holding fillers, softeners, colors and other such materials, and also soluble in a solvent to form smooth, homogeneous solutions, it may be considered the "gum" or the elastomeric base in the putty or sealant. The softeners, fillers, colors and other products dispersed in the neoprene modify the dried film left from the putty, and thus produce caulking and sealing compounds having the permanence, chemical inertness, toughness and adhesive characteristics necessary to perform a useful service. If "sealant" is defined as a material which seals, or is thought of as a flexible putty, this is the connotation applicable to neoprene putties and/or caulking materials.

For a product to be a satisfactory putty or caulking material, it must possess certain basic properties. It must be soft and plastic so that it can be easily worked and shaped as desired; it must retain this plastic workability for practical lengths of time; it must adhere well to a variety of surfaces; it must retain a degree of flexibility yet be firm enough to retain its shape throughout its service life; it must be resistant to weathering, sunlight, heat and a variety of air-borne contaminants and fumes; it must be water resistant and, in many cases, oil resistant; it must not exhibit undesirable shrinkage as it dries; in addition, it should be capable of being trimmed or sanded to an acceptable finish.

This is a rather extensive list of requirements and presents a formidable problem for an elastomeric material like rubber or neoprene. Realization that there was a need for a material that would satisfy these requirements and at the same time possess neoprene's outstanding resistance to weathering, oils, chemicals and oxidation, led to the development in 1942 of Neoprene Type KNR. For some types of caulking uses, other types of neoprene are often used. We will later show how a general-purpose type is used in a one-part caulking compound.

Ingredients of Neoprene Caulking Materials

Neoprene caulking compositions must, like all neoprene compounds, contain the necessary basic ingredients to produce satisfactory cures with good aging properties. A typical formulation suitable for this type of service is as follows:

Base for Caulking Material	
Neoprene Type KNR	100.0
Antioxidant	2.0
Thiuram E (Stabilizer)	2.5
Soft Carbon Black	100.0
Petroleum Process Oil	10.0
Total	214.5

Note: This article is based on a paper presented before a meeting of the National Paint, Varnish and Lacquer Association, at Washington, D.C., November 5, 1957.

Neoprene Type KNR, specially designed to satisfy the requirements of a sealant material, is finding use in a variety of commercial applications.

FIG. 2—The accelerator mix as it is being added to the caulking compound.

FIG. 3—Blending the caulking compound and accelerator to get an intimate mixture.

This base compound is mixed by conventional rubber processing methods using a rubber mill or an internal mixer. After the neoprene becomes a smooth running band on the mill, which usually requires three to four minutes, the antioxidant and Thiuram E are added. Increments of carbon black are then added followed by small portions of the process oil to aid dispersion. When the carbon black and oil have been incorporated, the batch is thoroughly blended, removed from the mill in thin sheets and cooled.

After cooling, the thin sheets are cut into small pieces and placed in a heavy-duty mixer of the "Sigma" blade type. A Werner-Pfleiderer or Baker-Perkins mixer is satisfactory. To the base (214.5 parts) is added 1.0 part of a chemical plasticiser for the neoprene. For this, Accelerator 552 (piperidinimum pentamethylene dithiocarbamate) is used. Solvent is then added to produce a solids content of 85 to 90%. Generally, xylene is preferred because it evaporates slowly, hence will not condense moisture on the surface. However, toluene or other aromatic solvents or a blend of aromatics and aliphatics may be used. Selection of solvent will govern the ultimate drying rate of the caulking.

Before being used, however, this caulking mix must be accelerated so as to provide a cure for the neoprene. Vulcanization may be carried out at room temperature, requiring ten days to two weeks. The time can be shortened by using elevated temperatures. Vulcanization is necessary to develop the toughness and elastic characteristics associated with good neoprene sealants. It is this step that produces a finished product meeting the requirements outlined earlier for a caulking material.

Composition of the Accelerator

The accelerator mix normally used consists of a slurry of litharge in a liquid accelerator. It is composed of twenty parts litharge and four parts Accelerator 833 (a condensation product of butraldehyde and butylamine). This accelerator slurry may be made in a simple paddle type mixer, although ball mills are preferred to break up possible agglomerates of the litharge particle. However, such mixes will cake on standing and are difficult to redisperse. To avoid this caking, the litharge slurry in solvent and Accelerator 833 may be added separately to the base compound. A litharge slurry in solvent will settle but will not cake.

This accelerator mix must be thoroughly blended into the caulking compound prior to use. This blending operation is shown in Figures 1, 2, and 3. Figure 1 shows the caulking material, being removed from the can and placed on the lid prior to mixing. The accelerator mix is in the small bottle. Note the consistency of the caulking material. In Figure 2 the accelerator mix is being added to the caulking compound. Figure 3 shows the operator blending the material to get an intimate mixture.

By adjusting the amount of accelerator mix used, working time of the putty can be varied from two to

FIG. 4—Caulking material being gun applied in a roof construction.

FIG. 5—Knife application of a neoprene caulking compound in a flashing operation on a masonry home.

eight hours. Using higher concentrations of accelerator will shorten the working time, but will produce cure in a shorter time. Of course, after the solvent has evaporated in one to two hours or more, depending upon the thickness of the putty, heating the caulking to 50°C. will produce cure in a couple of days. At 100°C., cure will take place in eight to twelve hours. Thus with these caulking mixes, the applicator has considerable flexibility and can easily handle many different types of jobs. The formulator may, by changing the formulation, produce softer, or non-black, or more adhesive materials. In other words, neoprene caulking materials can be custom made for the job. There are over a dozen companies who specialize in custom manufacture of neoprene sealants and paints for industrial and military uses.

To obtain best bond between the sealant and the substrate, a clean surface is the first requisite. Good adhesion may be obtained to a variety of surfaces, including metals, wood and concrete, by applying a primer to the clean surface. Satisfactory primers are prepared from a chlorinated rubber base. There are several commercial materials available. Such products as Ty-Ply S, Braze and the Thixons are satisfactory.

Composition of a One-Part Putty

Since these caulking materials have solids contents of approximately 85% and since they adhere well to most surfaces, they do not shrink and pull away as many crack fillers and sealers do. While the two-part putty described is the type most widely used, there are many places where a one-part putty is indicated. By taking advantage of the slow curing characteristics of unaccelerated Neoprene Type W mixes, one-part putties are now practical. A typical composition is as follows:

One-Part Putty

	Part A
Neoprene Type W	100
Magnesia	4
Antioxidant	2
Whiting	100–200
Petroleum Process Oil	10–50
Bentone 34	1–5
Zinc Oxide	5
	Part B
Heat Reactive Resin	45
Xylene	115
Magnesia	4–10

The Bentone 34 is a thixotropant, composed of bentonite clay which has been organically treated so that it is compatible in non-aqueous systems. The resin used is for the purpose of obtaining adhesion to metal, wood and other materials. Heat reactive butyl-phenol formaldehyde resins are preferred. The use of these resins in certain amounts (55 to 200 parts per hundred parts of neoprene) is covered by a patent held by Minnesota Mining and Manufacturing Co. (U. S. Pat. 2,610,910).

Part A is a dry mix, which is prepared on a conventional rubber mill or internal mixer. After mixing, Part A is placed in a "Sigma" type mixer and Part B is added. Parts A and B are then blended to form a one-part putty containing 75 to 85 per cent solids as desired.

A putty like the one described will be olive in color and will adhere well to clean surfaces of metal, stone, wood and other materials. The use of a primer coat is not necessary. This putty will not flow, although it will

FIG. 6—Neoprene putty, 100% solids, applied to fill pits in a propeller shaft preparatory to application of a neoprene sheet cover.

FIG. 7—Gun-type compound being used as a liquid gasket in making duct work tight.

remain soft, not reaching a full cure for several months. Even after attaining a full cure, it will remain soft and elastic.

Two types of sealants made from neoprene have been described. These putties can be used for a variety of purposes, in fact, wherever a crack filler or caulk is desired. Because they are more expensive than common tars and linseed oil whiting putties, their use is limited to those applications where the long life and general resistance qualities of neoprene are needed. Variations of these putties formulated without volatile solvents and containing 100 per cent solids are available in both knife consistency for hand applications and gun consistency for application through caulking guns.

These putties have many uses. Some of the typical ones are: (1) In building construction for sealing retaining walls, wall to floor joints, expansion joints, aluminum mullions and metal panels in panel walls, sealing around flashing and between panels in roofs, and around windows; (2) In highway work for deck to abutment bridge joints, and in highway and airport runway expansion joints; (3) On shipboard for sealing bulkheads, as crack filler in decks, and for filling pits in metal work such as propeller shafts prior to covering with neoprene compound; (4) In tanks for sealing between wooden staves, as filler in corners in tank lining operations, and for repairing damaged lining in neoprene tanks.

Other typical applications include use in sewer pipe joints, sealing storage batteries, for repairing holes gouged or torn in conveyor belt covers, and sealing joints between roof and side panels on tractor trailers. A few common uses are illustrated in Figures 4 through 7.

Neoprene caulking material flowing from a gun in roof construction is shown in Figure 4. Figure 5 illustrates the knife application of a neoprene caulking compound in a flashing operation on a masonry home. Figure 6 shows the application of neoprene putty, 100% solids, for filling pits in a propeller shaft preparatory to covering the shaft with neoprene sheet. Figure 7 illustrates a gun-type compound being used as a liquid gasket in making duct work tight.

Summary

We have shown that a good sealant is a material which will adhere well to a variety of surfaces, have minimum shrinkage, remain soft and pliable throughout its service life and resist heat, cold, chemicals, oils and weathering. We have described how this need was met through the development of Neoprene Type KNR, which was specifically designed for this purpose. The use of litharge and an organic accelerator and the preparation of an accelerator mix containing them is described. Adjustment of the accelerator to provide a range of working time and cure rate is discussed.

Methods of application, the need for a clean surface and the use of chlorinated rubber base primers for maximum adhesion to metals, wood and masonry are described. The composition, preparation and use of a one-part putty is described and its uses pointed out. A variety of uses for neoprene putties or caulking compounds is shown. It is hoped that this brief review of the use of neoprene in the field of sealants will stimulate thinking which will result in an even wider variety of uses for these materials in the future.

How a Golf Ball Is Made

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WHILE there is some reference in the records that a game resembling golf was played by shepherds tending their flocks in which they used their crooks to bat around pebbles, the first reference to a manufactured ball used for a game resembling golf pertains to the so-called feather ball. This has often been referred to as a hatful of feathers encased in a spherical shell of leather. Supposedly, a hatful of feathers was stuffed into a casing formed by pieces of leather stitched together, and closed after all of the feathers had been forced in. This ball, larger than the present day golf ball, was introduced around the middle of the 15th century and used for almost 400 years.

In 1843, a hard, thermoplastic gum known as gutta-percha was announced in Europe. This gum was obtained from certain trees and shrubs in the Dutch East Indies. In 1848, a smooth, round sphere of this gutta-percha was introduced and gradually replaced the so-called feather ball because of its greater distance and better feel. However, the flight of this smooth ball was very erratic. It is said that it did not take long for the players to discover that an old, played ball would fly truer and farther than a new ball. This fact was attributed to the nicks and scratches on the surface of the ball that had developed during play. Immediately, ingenious means were developed for marking the surface to produce a roughness of various patterns. The resulting truer performance and greater distance increased interest in the game of golf.

During this period, another thermoplastic gum, balata, obtained from trees in South and Central America, was also used in the manufacture of this ball. The balata used at that time was not considered to be of the same quality as the gutta-percha because it had a greater resin content with a resultant lesser gum content. It had been found that the greater amount of gum present seemed to give the gutty ball more resiliency.

In 1898, a man named Haskell produced a ball made with a solid rubber center around which was wound rubber thread under tension, and the whole covered with gutta-percha. Further refinements in the surface markings made this ball the forerunner of the modern golf balls.

Note: This article is based on a paper presented before the Connecticut Rubber Group at Orange, Conn., November 15, 1957.

During the early 1900's, the Haskell ball was made with a number of different types of centers. The solid rubber center was replaced by steel spheres, glass spheres, and later with balloon-like sacs filled with fluid pastes of various compositions. The present day dimple marking was adopted after a great many experiments on a trial and error basis. Since that time, experimental markings of various types have been tried, but the dimple marking has been found the most desirable and is used on practically all the golf balls produced today.

The dimples have a distinct function. When a golf ball is hit, two reactions take place. The ball receives a forward impetus from the club, and at the same time develops a spin. As the ball flies through the air, suction develops behind the ball and tends to make it drop to the ground. A ball with dimples, as it spins through the air, has the suction behind it broken up by the air brought back of the ball by the spinning dimples, which allows the ball to progress forward. A smooth ball, on the other hand, having no dimples or other marks, gets no assistance to break the suction or vacuum developed back of it, and therefore falls to the ground much sooner. In actual driving tests made with balls of identical construction, it was found that a smooth ball would go about 90 yards while a ball with dimples would go about 250 yards. There are 336 dimples on a golf ball, or at least there are that many on all brand makes.

Specifications and General Construction

The U. S. Golf Association has set up the following limits on the golf balls considered legal for play in the United States. Specifications state that no ball shall weigh more than 1.620 ounce, measure less than 1.686 inch, and have a velocity greater than 250 feet per second when tested on a U.S.G.A. apparatus at 75°F.

While all manufacturers try to live up to these specifications, their main objective is to pack as much quality as possible into a golf ball and stay within the legal tolerances. The manufacturer's own specifications demand maximum distance, proper feel and click, quick getaway from the clubhead, true flight and true putting characteristics.

While the manufacture of golf balls is seemingly an assembly operation consisting of winding thread around

FIG. 1—View of the operation in which wound balls are assembled between two shells or cups in preparation for molding.

a core, putting on a cover and painting the cover, a vast number of operations and processes are involved. One of the top sales executives of one of the largest rubber companies in the country said recently in a newspaper statement that of the thirty-three thousand items made by his company, golf balls are by far the most difficult. The problem is to make balls each identical to the other.

To satisfy the demand for golf balls to be sold at various prices, there are four basic constructions. The lowest price ball is generally made with a solid rubber center 1¼ inch in diameter. The next better grade is made with a solid rubber center 1⅛ inch in diameter while the better grade of this group is made with a solid rubber center 1$\frac{1}{16}$ inch in diameter. These balls are generally made with thread somewhat thicker than that used on the first grade balls because it is less expensive and also because it can be wound faster, and therefore makes the ball more economical to produce.

The top grade balls are all made with centers approximately 1$\frac{1}{16}$ inch in diameter. Most balls are made with liquid-filled centers. One brand is made with centers filled with a paste while several others are made with centers consisting of two hemispherical halves cemented around a small oil-filled capsule.

Various Types of Centers

There are many reasons for the various types of centers used in the top grade balls. Many manufacturers believe that a liquid-filled center gives a much sharper click or sound at impact. They also believe that a liquid is non-compressible, and therefore makes the ball recover faster from its deformation when struck with a club, resulting in a faster getaway and a pleasing feel. A ball that does not get away fast, feels heavy and is not as satisfactory to the player. Those who use the other types of centers probably have their own reasons and ideas about them.

Therefore, the first operation in making a golf ball is the manufacture of the center. Generally speaking, only natural rubber has been found completely satisfactory for this purpose. The usual known methods are used to compound a stock for whatever ultimate properties are desired.

The centers containing the small oil-filled or similar capsules are first molded into the two hemispherical halves, each containing a concave section to receive the capsule. After the halves are molded, they are usually cemented around the capsule.

The liquid-filled or paste-filled centers require very accurate calendering of the stock. A pellet of the fluid medium can be frozen and the stock pressed around it and later cured, or hollow rubber balls may first be prepared and later filled with the liquid. In another process, two pieces of uncured stock are sealed together on the edges, forming a sort of rubber pillow case which is filled with the necessary liquid. This filled container is then punched out with dies forming individual, uncured, rubber balls which are placed into molds where they are vulcanized.

After the center has been made, it must be frozen to prepare it for winding. This is important because to wind a true sphere, the center must retain its shape until it is completely surrounded by the thread of the winding operation. It is necessary in the case of liquid-filled centers to have them completely full with the air entirely eliminated. If there is any air present, the center will collapse when it thaws out and go off shape. This can result in erratic performance of the finished ball.

The Source of Power

While the center is the heart of the golf ball, the thread supplies the power. Selected smoked sheets are used for the thread in the majority of the top grade balls. There are many factors involved in the type of compound that can be used, the physical properties and size of the thread. These can be further complicated by the type of lubrication used on the thread, and finally limited by the type machine used for the winding operation.

All golf ball thread is made from pure gum stock, and its compounding is very important. It is vulcanized in the form of a sheet and then cut either with slitters or with rotary knives lubricated with water. Slit cut thread has been used in greater quantities in recent years, but

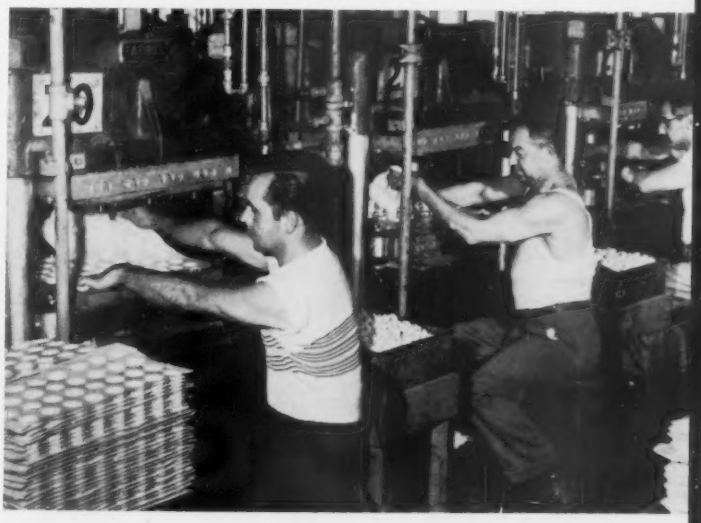


FIG. 2—Part of a press line where cover stock "cubes" or blanks are molded into cups.

FIG. 3—A row of presses where the cover of a golf ball is molded around the wound inner ball.

many report that it has not yet received the acceptance of the thread cut with rotary knives. The cut or slit thread, as it may be, is wound on spools.

The next step is to wind the thread around the frozen center. There are many types of machines available to do this with either of two basic patterns. One type machine packs the thread around the center rather tightly. Another type winds the thread with a more open weave or pattern. It is desirable to put on as much thread as possible to get maximum resiliency or distance consistent with proper feel and quick getaway. However, if the thread is packed too tightly, an outer layer of thread with a more open weave is required. If this is not used, the cover stock cannot penetrate properly in the molding operation. The outer layer controls the proper amalgamation of the cover stock to the wound ball.

In our plant, all of the wound balls are examined in an x-ray machine to make sure that the centers are wound perfectly round, and are centrally located to give the ball true performance. Our x-ray machines are so equipped that the wound balls are examined in all planes. Every single ball that we produce, even down through the fourth grade balls, is x-rayed after winding.

All types of winding machines have automatic stops so that when a ball has been wound to its predetermined size the machine will shut off. However, this is not completely foolproof, and after the balls have been wound they must be measured. This may be done by various means. The balls of proper size are then surrounded by two hemispherical cups and are ready for molding (Figure 1).

Cover Stock Cups of Balata

The cups of cover stock that are placed around the wound balls, prior to molding, are made of a compound containing balata as its principal component. Balata is a hard, thermoplastic gum that is obtained by the tapping of the balata trees in South America. The collected balata gum in crude form contains from 30 to 35% of the gum with the balance being impurities such as resins, bark, dirt and moisture. The balata is refined by a solvent process, so that when it is used in a cover stock compound, it contains approximately 98% of the gum and 2% resin. Balata comes from many sources, and its quality and working characteristics vary because of this, just as those of natural rubber do. Therefore, careful blending is required for proper molding characteristics and best durability.

Gutta-percha may be blended with or substituted for balata. Most of the gutta-percha used in this country comes from the Tjipetir estate in West Java. While balata is obtained by tapping the balata trees, gutta-percha is extracted mechanically from the leaves of cultivated plants. Although the extraction process is fairly complicated, a very pure gutta is obtained. The purified gutta is shipped to the United States packed in nitrogen to prevent oxidation. The purified gutta contains approximately 1% resin and 11% moisture, which must be dried out before it can be used.

Both balata and gutta-percha are hard, thermoplastic gums, measuring about 80 on the Type C Shore Durometer, and must be preheated prior to milling. The balata

FIG. 4—Spray room where golf balls are painted.

or gutta-percha, as the case may be, is blended with natural rubber on hot mills and mixed with whatever ingredients the particular manufacturer requires. The sheeted stock is then formed into cups through various steps preferred by the individual manufacturer. There are many methods known in the rubber industry by which the stock can be converted either into blanks, and from the blanks into cups, or directly from sheets or strips of stock into cups.

There are several methods for molding the cups from the prepared stock which is thermoplastic at this stage (Figure 2). In one of the methods, the heated stock is tubed into strips and cut into blanks of the proper size. The blanks are allowed to cool and placed into cavities of a cold multiple-cavity cup-forming mold. The loaded mold is then heated and sufficient hydraulic pressure is applied to cause the heated blanks to take the shape of the mold. After the stock has been heated and pressed out, the mold is chilled. This chills the formed cups enabling the operator to remove them from the mold.

In another method, instead of using cold blanks, warm sheets or strips of stock are placed into a cold mold, hydraulic pressure is applied to cause the stock to take the shape of the mold, and then the mold is chilled and opened, permitting the removal of the formed cups. In some methods the cups are molded individually while in others they are formed as a sheet. Therefore, it may or may not be necessary to die out or cut out these cups, depending on the method of molding used.

In most cases the flash or surplus stock can be reused. So far as we know, the majority of golf balls produced are molded with a stock that will not vulcanize in the molding operation. In view of the high cost of the balata and gutta-percha and other resins, it is practical and economical to mold this stock and reuse the flash or scrap.

Molding the Golf Balls

The wound balls with the two cups assembled around them are placed in multi-cavity molds containing plated cups (Figure 3). The balls are molded in hydraulic presses at a temperature only high enough to allow the stock to flow, and with suitable pressure so that the stock will encompass the wound balls without distorting them. During the pressing out operation the molds are hot, and at the end of this step they are chilled to enable the removal of the molded balls. The golf ball molds have projections in them to emboss the cover with the dimples.

When the balls are removed from the molds there is a very small amount of stock appearing as flash or rand adhering where the two cups have flowed together. To remove this flash, since the stock is still thermoplastic, the balls are chilled and then buffed. The quality of the buffing can be appreciated by the fact that the line or seam where the two cups flowed together is visible only to those who are aware of its exact location. Some of the flash may still adhere to the molded ball after the buffing and must be removed by a brushing or tumbling operation.

We know of only one process where the cover stock is mixed in the form of split batches, each containing part of the vulcanizing combination, immediately prior to molding. Balls molded with this stock will set up or cure after some length of time. In most of the other processes, part of the vulcanizing combination is included in the stock, and the balance or kicker is absorbed from a solution or emulsion. There are other similar methods on which patents have been issued and are available with details of these processes. In most of these methods, curing or vulcanizing takes place at slightly elevated temperatures in one to seven days, depending on the process.

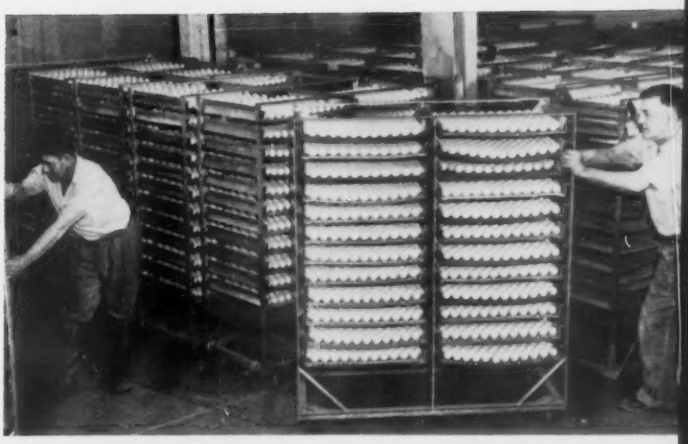


FIG. 5—Truckloads of freshly painted golf balls placed for drying under controlled heat and humidity.

Finishing Operations

After the balls have been vulcanized, since the accelerators are generally of such a nature that they will produce discoloration after the balls are painted, they must be properly cleaned. In addition to this, many manufacturers use surface treating processes to form a coating which is part of the cover itself, or apply a seal coat to prevent bleeding of any undesirable nature. The balls are then painted on spray machines that are basically similar (Figure 4). The selection of the type of paint varies with the manufacturer, each one using what he thinks is the most durable and has the best color retention. The amount of drying required and the number of coats of paint applied are determined by the individual manufacturer and the nature of the material that is used. The drying operation is seen in Figure 5.

The finished, painted balls may then be classified for compression, if necessary, and embossed or stamped with the brand name. After the name has been stamped on the balls they are packaged, ready for shipment.

Every manufacturer tries to control the quality of his product according to his own particular ideas, and each one tries to produce golf balls within the legal limits and within as small variations as possible in regard to weight, size, and trueness of center. As a final check, we, at Acushnet, have a driving machine which enables us to hit two balls at the same time, which gives us a special advantage in that we can make a comparative test of one ball against another hit simultaneously under the same atmospheric conditions. There are other driving machines in use but, so far as we know, they can only hit one ball at a time. From our own experience, we know that they cannot make as accurate a comparison as a machine that can hit two balls at one time. This, in essence, is the story of how golf balls are made.

Editorials..

ABC's of Tire Sales

► It is heartening to note that a particular bright spot in the rubber industry today is the passenger car tire sold at the retail level which appears headed for a sales record for the seventh straight year. Statistics for the first six months of this year show that shipments of replacement passenger car tires to retail outlets are running about 3.6 per cent higher than in the same period of the previous year. Shipments totaled almost 31 million units through June, 1958, compared with less than 30 million during the like period of 1957.

The second quarter shipment figures are especially encouraging being nearly 10 per cent higher than last year's second quarter total. With first quarter sales down nearly 4 per cent from the 1957 equivalent period, this is good news for the industry. If car tire sales continue to run at the same rate for the balance of the year, it is not unlikely that 1958 passenger tire shipments will amount to more than 58 million topping 1957 shipments by about one and one-half million units.

There are several reasons for the continuing high sales of passenger tires in a recession year. By year-end, the number of cars on the road are expected to reach above the 53 million mark, nearly 2 million more than last year. Tied to this is the fact that the average American operates his car as a necessity and will hang on to it as long as he can, even when economic conditions are unfavorable. He has to buy tires to keep his car rolling. Another factor is the 8 million cars produced in 1955. Original equipment tires on these cars have had to be replaced in most cases. Still another reason is that today's high speed driving wears out tires more quickly.

Agriculture tire sales are also proving to be somewhat of a surprise. Farmers are buying replacement tires for their equipment at a clip that promises to make 1958 the biggest farm tire sales year since 1947. Industry shipments of more than 1 million units in the first six months of this year ran about 21 per cent more than during the same period last year. It is now estimated that farm tire replacement shipments will exceed 1.7 million units in 1958 and may even pass the 1,739,000 units shipped in postwar 1947. It is reported that personal income on the farm is up nearly 10 per cent from a year ago.

The fact that replacement sales are doing well is good news indeed since original equipment tire sales were off about 10.9 per cent in the first half of this year compared with the first half of 1957. Total shipments of truck tires in the first half of this year fell by about 11.6 per cent.

Tire makers, however, are cheered by the fact that inventories have been going down, particularly in passenger car tires. At the end of June, passenger tire inventories had dropped to an estimated 17,480,000 units, or less than 1 per cent above 1957.

In balance then, the encouraging news from the replacement market is compensating, in no small measure, for the discouraging first half so far as original equipment sales are concerned. We can surely look forward to a brighter second half. The economy seems to be moving out of the doldrums—new cars are beginning to move off the assembly line and first reports of July tire sales are very hopeful.

The tire sales picture so far this year has been particularly encouraging for the smaller tire manufacturer, and several of these companies have reported substantial gains over the previous year. Cooper Tire for example, reported a net profit of $301,410 in the first six months of this year, against $155,351 in the first six months of 1957. Mohawk Rubber reported a net profit of $426,000 in the first half of the current year, compared with $187,000 in the first half of 1957.

Unlike many other industries, the smaller manufacturer in the rubber industry has not borne the brunt of the downward curve. If we accept the thesis that strength is built from the ground up, the rubber industry and the tire manufacturer in particular have much for which to be thankful.

ABC's of Magazine Sales

► A trade publication is a product—a product that must sell in the free marketplace. It is a product of many component parts, each of which must be tooled to a high peak of perfection and then welded together into a unified whole. It is a product that must be packaged as attractively as possible. To be a good product it must have an intrinsic value beyond its first impact. It must do several things. It must inform, instruct, advise and it must sell other products.

Any manufacturer of any product knows how well his particular baby is doing by the way it sells. In the publishing business, we rate our success upon two factors—circulation and the amount of advertising we attract. Between these two factors there is a link. If there is no accurate guide to circulation, the advertiser is at a loss to determine who is getting the product and what he is doing with it. That is why we belong to ABC—the Audit Bureau of Circulations.

ABC has been in existence since 1914 and membership now exceeds 3,700 subscribers of all types. It is a cooperative, non-profit venture of leading buyers and sellers of advertising space in the United States and Canada. The publishing fraternity considers ABC as the mark of circulation integrity. We pay to belong to ABC, and we consider it a worthwhile expenditure. We invest our money in ABC because we are certain of the value of our product and we are not afraid to have the ABC auditors confirm or deny our belief.

How does ABC help us to better our editorial product? First, by verifying who is buying our journal, not only by numbers but by type. It confirms, for example, how many manufacturers read our journal, how many suppliers, how many libraries keep it on hand. This permits us to accurately meet the demands of the buying public and to make sure that each issue does the job it is intended to do. ABC thus helps us to make a better editorial product. It keeps us on our toes.

What does ABC do for the advertiser? It assures him that his sales message is reaching the right people. If we were of a mind, we could run off a few thousand more copies of RUBBER AGE each month and distribute them haphazardly. You might walk into an office one day and see the officeboy looking through a copy. Would this sell more rubber, more chemicals, more machinery? Of course not! Would the office boy read RUBBER AGE if he had to buy it? Of course not.

The person who reads RUBBER AGE pays to read it. He is interested enough in the industry to pay for it—most often out of his own pocket. He is the fellow who buys—and he is the fellow that ABC counts and makes us account for. When you read an ABC audit, it tells you how many copies of RUBBER AGE are going where. The advertiser and his agency know they are not wasting their money in idle circulation. There are no waste copies of RUBBER AGE. It is a good sales investment.

To keep our product a good sales investment, we have to do many things. In the competitive market in which our product exists, we have to show a rising circulation all the time. If our readership falls, the advertiser will be less favorably disposed to place his money on the line.

To keep our circulation high we must continuously improve our product. In order to compete for the reader's time, we must select our articles, illustrations and reports with the utmost care and present them in a palatable fashion. We have to see that our readers come back for more—that our subscription renewal rate is high. (We are particularly proud that our renewal rate is now 82.23%.) If we don't meet the requirements of our audience, our circulation drops—ABC confirms the fact and then everybody knows.

This fact of everybody knowing—of putting the facts on the line, is what makes a publication's membership in ABC important. Any time you would like to see our ABC report—it is issued twice a year—drop us a line and we will be pleased to send you a copy. And look for the ABC symbol on the publications you read. You will find it in every copy of RUBBER AGE.

How to use the

Rubber Futures Market

to lessen price risks

Traders in rubber futures on Commodity Exchange, Inc. gathered around the trading ring transacting their buying and selling.

Recognizing the need for basic information on trading in the rubber market to best advantage, the editors of RUBBER AGE *have had this Special Industry Report prepared by Sol Gold and Kay Sahagian of the Commodity Department of Merrill Lynch, Pierce, Fenner & Smith. They discuss the use of futures in the rubber trade, describing what they are and what benefits they can bring to the persons who know how to use them properly. Their information provides insight into one facet of the rubber market from which the industry, in not using to full advantage, often fails to reap attainable benefits.*

RUBBER PRICES are usually hard to pin down. A period like the present, with relative price stability and without the dynamic upward surges realized in periods of international stress or in subsequent sharp declines, has not been experienced too frequently in the postwar period. But even dullness and lack of price change have their compensations—they offer the moment for pause to reflect on market potentials.

In rapidly moving markets, up or down, the rubber trade has been interested in inventory profits and losses — increasing the former and eliminating the latter. Most transactions in life, however, are more complex than this. So, too, with rubber prices.

At the present time the opportunity for reflection points to the need for reducing price risks during the periods of extreme price movements—lessening the possibilities of loss and of unfavorable financial statements. How best can this be done—how can the company that requires working inventories avoid the risk of price depreciation? A method all too often neglected in the rubber trade affords an approach to this objective. The rubber futures market offers the opportunity for trade concerns to offset inventory price risks. Sales of futures made against inventory commitments offset the risk; they enable the dealer or consumer to operate on the basis of a normal commercial profit rather than seek the advantage of the speculative price advance. But what are these futures contracts and just how can they be used?

There are four rubber futures markets in the world—in London, Singapore, Amsterdam and New York. The last named, on the Commodity Exchange of New York, Inc., is the exchange to which we will make reference herein for the purpose of identifying American actual rubber prices in relation to futures. A futures market is a place where buyers and sellers meet to make contracts in a standardized form for raw rubber to be delivered or received at a future date. Commitments are made in terms of a specific month of delivery for a set amount of a particular quality of rubber to be delivered at any of certain locations.

In New York, for example, the contract unit might call for the delivery of ten long tons (22,400 pounds) of No. 1 RSS (Ribbed Smoked Sheets). In order to allow the greatest utilization by the trade the contract permits the delivery of off-grade No. 1's at a slight discount from the basic contract price which applies against the No. 1 RSS. This discount is established periodically in accordance with prevailing commercial differentials. While the contract provides that the buyer commit himself to take delivery and the seller commits himself to make delivery, the volume actually transferred in this manner is small. Buyers and sellers find it more advantageous to buy back what they earlier sold or to sell out what they bought in preference to employing the actual delivery process.

Futures Related to Actual Prices

But futures do not operate in a world of their own. True, they are separate contracts but the prices for these contracts have a definite relationship to the prevailing day-to-day prices for natural rubber. The relationship between the price of the physical product and that of futures contract is known as "basis". This basis varies. By gaining familiarity through examination of previous relationships and then by utilizing the futures markets in a small way, trade interests can learn to use basis to their advantage.

What does this mean? Merely that the user of a specific grade of rubber should compare his own record of prices which he has paid for that particular grade with past records of futures price movements. Firms like Merrill Lynch, Pierce, Fenner & Smith have done this many times for members of the trade who have sought to determine the relationship that existed between the types of rubber they use and futures contract prices. From these observations programs have been worked out which trade members have been able to follow to their advantage.

To define what we are talking about: A purchase of physical rubber would be offset by a sale of rubber futures; a sale of rubber without having the physical rub-

ber, or a contract for it in hand, could be offset by a purchase of rubber futures. This process of placing a transaction in futures against a commitment in actuals is known as hedging. How does this work? For example, around May 1, a dealer finds that the quantity of crude rubber he has on hand is backing up, it is not moving as rapidly as it had heretofore. The price of natural is 27c per pound. The 30 long tons he has on hand represents a substantial amount. He, therefore, sells three September rubber futures at, say, the prevailing price of 27.50c a pound. He is looking for protection against price decline and hopes that between then and late August to dispose of the excess rubber he has on hand. He does not plan to actually deliver the rubber on the futures market although he knows that if he cannot dispose of his 30 tons in the open market by then, he can deliver the quantities which are permitted for delivery on the exchange on the basis of his 27.50c sales price.

Two things could then happen. Prices could go up, in which case the price at which he actually sells his rubber will be higher than the 27c level, but he will have about an equal amount of loss on the 27.50c sales price of his rubber futures. One would about offset the other. The other possibility is that prices might go down. This is the more likely alternative, because rubber was not moving too well. In this case, he would have a decline from the 27c level on his actual selling price. Maybe he would sell it at only 24c per pound, meaning a 3c loss. But probably the full 3c decline would also have occurred in rubber futures so that he could buy back his short position (eliminate his obligation under the futures contract). The gain he makes in futures is used to offset the loss he has on the actual rubber.

Basis Gains and Losses

Of course, these figures are used in round terms, with profit and loss offsetting each other exactly. Here is where basis comes in. At the time when the futures were sold, the September future was 50 points (.50c per pound) over the latest quoted price on natural rubber. That reflected in some small measure the carrying cost to September. Possibly by August 1 when the actual rubber is sold at the 24c price, September futures may have declined to 24.25c, so that the price relationship would show 25 points (¼-cent) premium for the futures market.

The change of basis in a case like this is known as a basis gain. It just as easily could be a basis loss in another transaction. With careful initiation of hedges, however, basis gains and losses usually even out. In any event, even a basis loss plus the cost of commission is a small enough insurance premium to pay for the protection which the hedging process affords against a major price change.

The transaction described is what is called a hedge *sale* against inventory. The prices can be set up in reverse through a buy hedge against a forward sales commitment when the physical is not "owned". In brief, had the dealer made his sale at 27c without owning any rubber and bought the September future at 27.50c, he would be *buy* hedging. The outturn could very well have been about the same as above except that there would have been a basis loss of .25 points (¼-cent per pound).

But it must be recognized in a case like this, that when the dealer wanted to do the business, the rubber was not there, available for him to buy, at that time at his price. But the futures market—fluid, flexible and constantly available — was there to give him his protection in case the price rose in the meantime. Another consideration, he would have looked carefully at the 50 point (½-cent) basis differential and weighed it against previous experience. If past experience did not indicate that this could be fully recovered in working out his actual purchase, he would possibly forego the business.

In this instance we have used a dealer for illustration—it could just as well been a processor of rubber. His sales might well have been not just crude rubber but rubber in terms of finished rubber products. The example would be equally valid.

The types of rubber might well have been other qualities than those which can be delivered on the futures contract. But since the different grades of rubber hold a comparatively constant relationship to each other, he would assume that the relationship between these grades and futures would fluctuate in the same manner as the basic grade.

The Rubber Futures Market and the Cold War —

A vital factor for the rubber industry today is the effect of international tensions on the price structure of rubber. Recently we have witnessed a rise in prices due to crises in the Middle East. At this moment the Chinese Communists are making threatening gestures towards Quemoy and Matsu—direct action against these islands would undoubtedly cause rubber prices to rise. In these times of cold war and hot tensions, the futures market reflects almost immediately the changing factors which affect prices. This barometer for the industry provides a means whereby immediate steps can be taken to take advantage of these changing factors.

Special Industry Report

Actually what does the hedge accomplish? It eliminates or reduces risk in periods of major price movements in rubber, and, as is well known, we have had plenty of those. It protects against disaster. But it also eliminates the possibility of good inventory profits. This must be acknowledged. But it also must be appreciated that one cannot eliminate the risk and still claim the profit. To do this would be like eating your cake and having it too. Yet operating without hedges leaves the trade speculating.

Hedged commodities are favored by lending institutions for financing. Banks have learned the price risk reduction which is afforded by hedges. They, therefore, are willing to grant much more favorable terms for hedged commodities. This is an important consideration to trade members, particularly in times of tight money.

In the buy hedge there are equal advantages. The futures market offers an alternative market to the party who has to buy rubber to meet sales commitments. In the case of futures, there are many instances in which forward contracts (those for a much later delivery) do not sell at prices above those for nearer delivery. In fact, those futures sometimes sell at appreciable discounts as compared with those for nearer months. Buy hedges initiated in these periods have saved the buyer possible storage charges, interest on money and other expenses. And basis in many of these periods will usually work to the advantage of the buyer of the hedge.

In summary, therefore, what futures offer to the rubber trade is no assured panacea, no guarantee of profit, no cure-all for uncommercial operations. But futures definitely afford an alternative market which rubber trade members might well examine for eliminating or reducing price risk, for providing themselves with new outlets or sources of rubber, and a means for securing better financing. All these advantages are realizable; but to attain them the same careful attention which is given to bargaining for actual rubber must be practiced. This, however, is to be remembered—the benefits are well worthwhile!

Attorney General Reports on Competition in Synthetic Rubber

Third Report Cites Lack of Price Competition

► The Attorney General of the United States, in accord with current practice, has submitted to the President and the Congress a report on "Competition in the Synthetic Rubber Industry" in which he evaluates the character of competition in the industry during the calendar year of 1957. This is the third such report, prepared in response to the request of the Senate Committee on Banking and Currency made at the time the Government disposed of its wartime synthetic rubber facilities to private industry in 1955. In the current report, the Attorney General stressed that his findings and opinions cannot be considered as expressing in any way conclusions relating to possible or potential violations of the anti-trust laws.

The report declares that the two developments in 1957 most significant to competition were the transition to a buyers' market, resulting from the considerable expansion of the industry since 1955, and the entry of a number of new producers into various segments of the industry. Both factors, it was stated, appear to have led to "more vigorous rivalry for customers in 1957 than at any time since the transfer of the industry to private ownership."

However, the Attorney General also pointed to the existence of a few factors adverse to competition. Of primary concern, it was said, was the almost complete lack of price competition in the industry. It was emphasized that there can be no fully effective competition so long as this lack of price rivalry continues.

The annual report is based upon an investigation of all known producers of S-type, butyl, neoprene and N-type synthetic rubber, together with producers of butadiene and styrene, important raw materials of synthetic rubber. It includes companies which constructed their own privately-financed facilities, as well as firms which acquired facilities under the Government disposal program. The survey also covered a representative sample of small business enterprises engaged in the fabrication of rubber products.

"These reports are particularly important," said the Attorney General, "not only to advise Congress of the continuing results of its disposal action, but also as an aid to the synthetic rubber industry itself. So far as we know, comparable statistical data on competition in the industry are not available from any other source. Therefore, according to the reports we received, the industry considers these publications as exceedingly useful reference manuals."

S-TYPE RUBBER PLANT CAPACITY—1955-58*

Company[1]	May 1, 1955 Long Tons (000)	Dec. 31, 1957 Long Tons (000)	Anticipated Capacity Dec. 31, 1958 Long Tons (000)
Goodyear (1)	146.5	255.6	255.6
Firestone (3)	129.6	230.0	230.0
Goodrich-Gulf (2)	95.0	232.0	242.0
Shell (5)	94.0	126.0	126.0
Texas-U.S. (4)	88.0	127.0	143.0
Phillips (6)	69.4	111.0	133.0
United Rubber (8)	62.0	69.8	69.8
Copolymer (7)	49.0	75.0	95.0
A.S.R.C. (9)	44.0	68.5	68.5
U. S. Rubber (11)	22.2	30.0	30.0
General (10)	...	40.0	40.0
All other[2]	...	22.8	23.3
Total	799.7	1,387.7	1,456.2

Notes: *—Including the weight of oil and carbon black, and assuming the "normal pattern of production" experienced by the company; 1—Companies are listed in order of relative size at the time of transfer to private ownership, the number following company name identifies the rank in order of 1957 S-type capacity; 2—Includes Dewey & Almy Chemical Div., W. R. Grace & Co., and International Latex Corp.

Transition to Buyers' Market

In his findings and opinions the Attorney General explained that the transition to a buyers' market was a product of the considerable expansion of the industry, particularly in the S-type rubber and butadiene segments. The resulting increased production considerably outstripped the current demand, leading to customer competition among producers to dispose of accumulated stocks. This increased competition is indicated in the improvement and extension of technical services, the introduction of freight allowances or equalization, the improvement of existing grades and the addition of new grades of synthetic rubbers. "I have noted more vigor-

ous rivalry for customers in 1957 than at any time since the transfer of the industry to private ownership. The comments of the small fabricators in this respect are most encouraging," he declared.

The Attorney General noted that a number of new producers have entered various segments of the industry during 1957. Those whose entry was early enough in the year for operational statistics to be meaningful appear to have introduced new competitive elements by engrossing respectable shares of the market from existing producers. The other new companies represent a competitive potential, the extent of which cannot yet be ascertained.

Equally significant was their reported ease of entry. No patent, technological or other barriers appeared to have impeded their efforts to gain a place in the industry. This is particularly significant in the field of butadiene where patents are more closely held than in the S-type field. All but one of the new producers are developing their own patents and technology or are obtaining them from private sources. Only General Tire is utilizing the patent rights and technology offered by the Government. In this connection, it should be noted that in 1957, the Government continued to release to the public the research papers accumulated under its synthetic rubber research and development program.

S-Type Capacity

The substantial growth of S-type rubber was accompanied by a broadening in the base of capacity in the industry. The leading share of 18.4 per cent held by Goodyear was significantly less than the 21.1 per cent held by 1956's leader, Goodrich-Gulf. Since the transition to private ownership, there has been some increased concentration in the collective share of the market held by the three leading producers, Goodyear, Firestone and Goodrich-Gulf. In the present buyers' market, however, their 9.2 per cent increase in production does not appear to be as significant as the fact that their share of production actually sold increased by only 1.1 per cent since 1955. These increases appear to be largely at the expense of other larger companies. The smaller firms in the industry apepar generally to have strengthened their positions slightly.

It should be noted that in this collective increase, Firestone and Goodrich-Gulf remained fairly constant. The increase derives almost wholly from Goodyear's rising percentages in each category. The Attorney General said that he is aware of no factors other than competition to account for this strengthening of Goodyear's position.

In butadiene, over-expansion has led to increased competitive efforts. Independent elements in the industry appear to be more than holding their own, and sales on the open market are on the increase. The gradual development of markets for butadiene other than the synthetic rubber industry raises the hope that its producers, like those in styrene, may achieve a moderate degree of independence from that industry.

Among the specialty synthetic rubbers, neoprene may be gaining ground very slightly at the expense of butyl. In the latter field, it is somewhat disappointing that initial construction of the projected Lake Charles plant has been delayed, the Attorney General declared. Nevertheless, there remains an increasing potential for future butyl competition, both from this source and from U. S. Rubber's development of a new type of butyl.

Small business felt that the performance of the synthetic rubber industry in 1957 was satisfactory. Supplies in general were more than adequate, and the companies sampled stated that they had obtained a

THE SYNTHETIC RUBBER INDUSTRY IN 1957

Company	Plant Location
S-Type Rubber Plants	
American Synthetic Rubber Corp.	Louisville, Ky.
Copolymer Rubber and Chemical Corp.	Baton Rouge, La.
Dewey & Almy Chemical Div., W. R. Grace & Co.	Cambridge, Mass.
Firestone Tire & Rubber Co.	Akron, Ohio; Lake Charles, La.
General Tire & Rubber Co.	Odessa, Texas
Goodrich-Gulf Chemicals, Inc.	Port Neches, Texas; Institute, West Va.
Goodyear Tire & Rubber Co.	Akron, Ohio; Houston, Texas
International Latex Corp.	Dover, Del.
Phillips Chemical Co.	Borger, Texas
Shell Chemical Corp.	Los Angeles, Calif.
Texas-U. S. Chemical Co.	Port Neches, Texas
United Rubber & Chemical Co.	Baytown, Texas
U. S. Rubber Co.	Naugatuck, Conn.
Butyl Rubber Plants	
Esso Standard Oil Co.	Baton Rouge, La.
Humble Oil & Refining Co.	Baytown, Texas
Neoprene Rubber Plants	
E. I. du Pont de Nemours & Co.	Montague, Mich.; Louisville, Ky.
N-Type Rubber Plants	
Firestone Tire & Rubber Co.	Akron, Ohio
B. F. Goodrich Co.	Cleveland, Ohio
Goodyear Tire & Rubber Co.	Akron, Ohio
International Latex Corp.	Dover, Del.
U. S. Rubber Co.	Baton Rouge, La.
Butadiene Plants	
Copolymer Rubber & Chemical Corp.	Baton Rouge, La.
Dow Chemical Co.	Freeport, Texas
Esso Standard Oil Co.	Baton Rouge, La.
Firestone Tire & Rubber Co.	Orange, Texas
Goodrich-Gulf Chemicals, Inc.	Port Neches, Texas
Humble Oil & Refining Co.	Baytown, Texas
Odessa Butadiene Co.	Odessa, Texas
Petroleum Chemicals, Inc.	Lake Charles, La.
Petro-Tex Chemical Corp.	Houston, Texas
Phillips Chemical Co.	Borger, Texas
Shell Chemical Corp.	Torrance, Calif.
Standard Oil Co. of Calif.	El Segundo, Calif.
Texas Butadiene and Chemical Corp.	Channelview, Texas
Texas-U. S. Chemical Co.	Port Neches, Texas
Union Carbide Corp.	Charleston, West Va.; Texas City, Texas; Seadrift, Texas
Styrene Plants	
Cosden Petroleum Corp.	Big Springs, Texas
Dow Chemical Corp.	Freeport, Texas
Foster Grant Co., Inc.	Baton Rouge, La.
Koppers Co., Inc.	Kobuta, Penna.
Monsanto Chemical Co.	Texas City, Texas
Odessa Styrene Co.	Odessa, Texas
Shell Chemical Corp.	Los Angeles, Calif.
Union Carbide Corp.	Institute, West Va.

MARKET POSITION OF S-TYPE RUBBER PRODUCERS, 1955-57

Company[1]	Per Cent of Capacity May 1, 1955 (Rev.)	Per Cent of Capacity Dec. 31, 1956	Per Cent of Capacity Dec. 31 1957	Per Cent of Production 1955	Per Cent of Production 1956	Per Cent of Production 1957	Per Cent of Domestic Sales 1955	Per Cent of Domestic Sales 1956	Per Cent of Domestic Sales 1957
Goodyear (1)	18.3	14.6	18.4	17.7	18.4	24.2	23.0	16.6	23.1
Firestone (3)	16.2	17.3	16.6	19.1	20.6	20.6	19.9	18.1	19.1
Goodrich-Gulf (2)	11.9	21.1	16.7	12.7	12.9	13.9	10.3	11.5	12.1
Shell (5)	11.7	11.5	9.1	10.2	9.5	7.7	10.6	10.0	8.5
Texas-U.S. (4)	11.0	11.6	9.2	12.0	12.8	7.0	10.4	12.5	9.2
Phillips (6)	8.7	6.5	8.0	7.1	6.9	8.3	8.0	9.7	8.3
United Rubber (8)	7.8	5.6	5.0	3.7	4.9	4.4	5.0	7.6	6.2
Copolymer (7)	6.1	5.5	5.4	6.4	6.8	7.1	5.6	6.8	7.2
A.S.R.C. (9)	5.5	4.0	4.9	6.6	4.4	4.0	5.3	4.5	3.7
U. S. Rubber (11)	2.8	2.3	2.2	2.6	2.7	2.4	1.9	2.7	2.5
General (10)[2]	..	..	2.9	..	..	0.3	..	..	0.1
All other[3]	..	..	1.6	1.9	..	0.1	..	..	..
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes: 1—Companies are listed in order of relative size at the time of transfer to private ownership, the number following company name identifies the rank in order of 1957 S-type capacity; 2—Since General was in production only at the end of 1957, its percentages are unrepresentative of its operations on an annual basis; 3—Includes Dewey & Almy Chemical Div., W. R. Grace & Co., and International Latex Corp.

fair share of synthetic at fair prices, the Government official reported.

On the other hand, he said, still of primary concern is the almost complete lack of price competition. There seems little excuse for continuing the price uniformity, born of Government ownership, into a period marked by a buyers' market and in the face of a recent decline in the price of natural rubber. True, there has been some competition in the furnishing of technical services, in quality and in other factors, but there can be no fully effective competition so long as this lack of price rivalry continues.

The year 1957 saw no perceptible improvement in West Coast conditions. They have remained somewhat static, with Shell continuing to supply almost all of the market aside from a portion of requirements of the large tire plants. Direct competition from other producers in minimal, although Shell must compete with other producers for its business east of the Rockies, and with the Gulf Coast plants controlled by its major West Coast customers. Smaller West Coast fabricators may be the ultimate beneficiaries of such competition. During 1957, they continued to report satisfactory treatment from Shell.

Although developments in 1957's buyers' market were satisfactory to small business, this area may possibly give concern in provisions in a different business climate. At such time, the lack of clearcut provisions in the plant disposal contracts, as to the extent of the required commitment of output to small business and as to what constitutes small business, may be more serious.

"In summary," said the Attorney General, "I find that the status of competition has shown some improvement in 1957. Certain unfavorable factors do exist and must be watched with care, but I believe that on balance, developments in the industry as a whole show some progress toward a 'free, competitive, synthetic rubber industry,' the ultimate goal of the Disposal Act."

ASME Rubber Division Plans Annual Meeting

► Rubber and Plastics Division of the American Society of Mechanical Engineers will hold its Annual Meeting on December 3 and 4 at the Hotel Statler in New York City. The meeting will consist of three technical sessions, each covering a broad general topic. The first session will cover "Adhesives", while another will be devoted to "New Materials and Significant Research on the Physical Nature of Plastics". The third session will concern itself with "Design of Engineering Properties in Plastics."

Dr. D. M. Alstadt (Lord Mfg.), has been named chairman of the technical session on "Adhesives", which will be held at 9:30 A.M. on Wednesday, December 3. R. F. Westover (Bell Telephone Laboratories), will serve as vice-chairman. Papers to be presented at the meeting are:

"Epoxy Resins and Their Application as Adhesives," by D. Richart, S. H. Richardson and C. F. Pitt (Bakelite).

"The Strength of Curved Glued Laminated Wood Timbers as Affected by Radius of Curvature and Lamination Thickness," by William J. Finnoran (Timber Engineering).

"Control of Flexural Strength of Glass-Fiber Resin Laminated by Glass Surface Treatment and Theoretical Implications," by Nicholas M. Trivisonno (Goodrich Research Center).

"Recent Developments in Reinforcement," by William E. Dirkes (Wright-Patterson Air Force Base).

"Prediction of Load and Creep Deflection in Beams and Eccentrically-Loaded Members," by O. M. Sidebottom and S. Dharmarajan (University of Illinois).

The second session, scheduled to be held at 2:30 P.M. on Wednesday, December 3, will cover the topic of "New Materials and Significant Research on the Physical Nature of Plastics". The session will be presided over by Bryce Maxwell (Princeton University), and the following papers will be presented:

"Some High Speed Tensile Properties for Thermoplastics," by Richard E. Ely (Army Rocket Agency).

"Designing with DuPont 'Delrin' ", by Watson C. Warriner (DuPont).

"Applications of Solid Polyurethane," by K. H. Grim (Disogrin Industries).

"Review of Developments in Plastics Engineering, 1957-1958," by R. A. Clark and R. I. Leininger (Battelle Institute).

"Polymers are Not Products in Plastics Fabrication," by J. E. Tollar (Dow Chemical).

The last session, "Design of Engineering Properties in Plastics", will be held at 9:30 A.M. on Thursday, December 4, with E. G. Bobalek (Case Institute) as chairman. Papers scheduled for this session include:

"Molecular, Microscopic and Macroscopic Structural Data in the Design of Plastics Molding Compositions to Fit Service Specifications," by Robert M. Evans (Master Mechanics) and E. G. Bobalek.

"Significance of Physical Test Methods in Interpreting Design Properties of Plastics," by Robert M. Evans and S. M. Skinner (Case Institute).

"The Course and Kinetics of Chemical Degradation through Testing of Mechanical Properties of Plastics," by J. Neil Henderson, Tito T. Serafini and E. G. Bell (Case Institute).

"The Liaison Problem of the Translation of Laboratory Design Data into Production Practice," by Robert Gelin and Robert F. Toomey (Case Institute), and William Ellslager (Glidden).

"Important Design Considerations for Reinforced Plastics," by Perry Nara (Case Institute).

"Summary of Papers Presented at Rubber and Plastics Sessions, I, II, and III," by D. H. Cornell (Knolls Atomic Labs.).

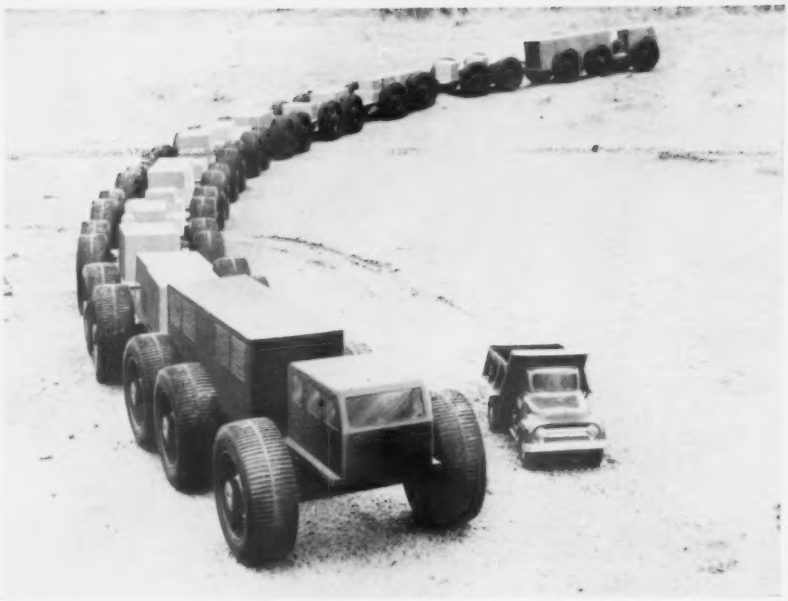
Marks Reports on Russian Rubber-Plastics Activities

► Some of the most advanced forms of synthetic rubber and plastics are being commercially developed by the Russians, according to a report by Dr. Herman F. Mark, after a two week tour of the Soviet Union. An internationally known scientist, Dr. Mark is the director of the Polymer Research Institute of the Polytechnic Institute of Brooklyn. He made these comments at a press luncheon held by the Foster Grant Co., plastics and chemicals producer, for which he is a staff consultant.

During his Soviet visit, he was shown scientific institutions in the Moscow and Leningrad areas as a guest of the Russian Academy of Sciences. He said the Russians were turning out linear polyethylene, polypropylene synthetic fiber, and polycarbonate plastics—items just getting a foothold in United States markets. The Russians also are making an excellent "synthetic-natural" rubber that apparently has most of the qualities of types recently developed in this country, and are turning out 3,000,000 to 4,000,000 pounds a year, Dr. Mark reported.

Production of all types of polymer synthetics in the Soviet Union is 20 to 30 per cent of the volume in the U. S., he continued, but under a new seven-year program the Russians hope to increase commercial output of plastics eight-fold, and of artificial and synthetic fibers more than four-fold. This apparently is being done as one of the fastest and most economical means available of showing its own people and the rest of the world some tangible evidence of an improved standard of living, he said. The principal obstacle to increased production is the lack of technically trained people despite the fact that education in the Soviet Union has been "accelerated by all conceivable means," he stated.

Dr. Mark declared, "All research, as far as I was able to determine, is of good quality and some projects are remarkably well directed and have already led to interesting results. Nowhere, however, did I see a material, a method or an approach which was not known to me in principle either from our own work or from technical literature." He reported also that the Russians borrowed freely—and usually without any acknowledgment—from patented technical processes of other nations, and did not adhere to the International Geneva Convention patent agreements.



Develops Nuclear-Age Trackless Train

► A gigantic but nimble cross-country train, suitable for power by either atomic reactors or conventional types of engines, has been designed by R. G. LeTourneau, Inc., Longview, Texas. An electric all-wheel-drive model has been built and tested to prove that the advanced design is workable. The rubber-tired train possesses two radical characteristics: all-wheel drive with a powerful electric motor geared directly to the rim of each individual wheel; and a unique steering arrangement which assures that the last car of each train will follow the tracks of the first car, regardless of how many cars may be in between. Another major feature of the 52-wheel train is a highly simplified suspension system which provides smooth boat-like riding characteristics. Part of this is achieved through an arrangement which the company calls "walking beams" and "oscillating axles."

Utilizing what are said to be the world's largest tires, measuring 10 feet high and 4 feet wide, the cross-country train will have a speed of about 20 miles per hour. The 2,000-or-more horsepower can be geared for either maximum speed or maximum power, depending to some extent upon terrain conditions over which the train is expected to operate. Company spokesmen said the train is strictly an off-highway vehicle and is designed for operation over vast expanses of underdeveloped areas, like the Arctic or the Sahara. The company said that conceivably, the new train could be operating within the coming year.

Reeves Moves New York Offices

► Reeves Bros., Inc. has moved its New York City offices from 54 Worth St. to 1071 Avenue of the Americas in order to be in closer proximity to many of the company's customers. The last three divisions to move at the end of June were the Vulcan Sales Division, the Plastic Sales Division and the Industrial Sales Division. Earlier, the general and administrative offices, the Greige Sales Division and the Finished Goods Sales Division had moved to the new midtown location.

Offers New Silicone Antifoams

► Hodag Chemical Corp., Chicago, Ill., has introduced a new series of silicone antifoams which are said to provide the efficiency of standard silicone antifoams at a substantial cost saving. An extensive field engineering service is offered by the company to help users in the selection and application of the new antifoams. Foam problems are analyzed and the user is provided with a free sample quantity of silicone antifoam suited to his needs as well as detailed information as to the antifoam's application in the operation. The new silicone antifoams are said to provide quick foam knock-down; last longer and to have a long storage life. The new products are supplied as concentrates ready to use on delivery, or for quick, convenient dilution and can be frozen, boiled or sterilized without losing effectiveness, the company states.

Amoco Appoints Kaufmann

► Amoco Chemicals Corp., Chicago, Ill., has appointed Kenneth A. Kaufmann to the newly created position of supervisor of plastics market research and development. Mr. Kaufmann holds a bachelor's degree in chemical engineering from Pratt Institute and a master's from Rensselaer Polytechnic Institute. He comes to Amoco from Spencer Chemical Co. where he was manager of plastics technical service and the sales service laboratory. He joined Spencer in 1954 as head of plastics applications research. From 1943 to 1953 he held a number of positions in plastics research, product development and production with Celanese Corp., Gering Products, and Catalin Corp. A Navy veteran, Mr. Kaufmann is a member of the American Society for Testing Materials, Society of the Plastics Industry, and Society of Plastics Engineers.

This modern building houses the Rubber Research Association of Israel. Situated on a hill overlooking Haifa Bay, the new building is a part of Technion City, said to be one of the most beautiful college campuses in the world.

Rubber Research Association Opens New Facility In Israel

► Dedication of a new laboratory and technical development center at the Israel Institute of Technology, known as Technion City, has been announced by the Rubber Research Association, Ltd., of Haifa, Israel. The Association is an autonomous body, owned and operated by a board of management of the rubber manufacturers of Israel. A large portion of the major equipment of the Association, as well as the building itself, has been financed by the U. S. Operations Mission acting through the Israel-America Joint Fund. Among the dignitaries present at the dedication ceremonies, was John Haggerty, director of the U.S.O.M. to Israel.

Previously housed in the waterfront area of Haifa Bay, the new quarters of the Rubber Research Association in Technion City command a sweeping view of the harbor, the Valley of Zebulun and the Hills of Lebanon. The Association is housed in a modernistic split-level building, shared with the Ceramics Research Association, and set in a large forest, high on the slopes of Mr. Carmel. The founding of the Association dates back to 1951 when the Israel Research Council suggested that industry form research and development organizations to facilitate production within the specific industries. In 1952, the Rubber Research Association was founded and a separate plastics research laboratory was begun the following year.

Since that time the Association has played a significant role in the expanding Israeli rubber industry. Today, $8,960,000 worth of tires are produced annually by Israel's two tire factories, of which $4.2 million are earmarked for export. In 1956, the total value of the rubber industry amounted to $11,200,000 and the prediction for the current year estimates that figure to be doubled.

The Association functions primarily as a technical service laboratory and clearing house for published information. New materials and processes are also studied and the members of the Association are introduced to these through the studies of the laboratory. Assistance is also given to local manufacturers in maintaining production at the standard of quality required by the rubber industry for such materials as factice, resins and ground minerals. In addition, the laboratory acts as a testing house for large users of rubber by investigating and supervising the quality of the rubber products. Some original research work is also carried out and a number of papers have been published by members of the Association.

A grant made available by Godfrey L. Cabot has made possible two projects which will enable Technion students to be employed on a part-time basis. At present, there are 29 member groups participating in the Association, which is 100 per cent representative of the $22 million Israeli rubber industry. Nineteen of the member groups employ less than 30 workers and only four have 100 or more employees. Operating on such a limited scale, most of the factories cannot maintain even a most primitive kind of laboratory, thereby increasing the responsibility and necessity of the Association.

Among Best In World

Dr. H. J. Stern, who is serving as the United Nation's Technical Adviser on Rubber to Israel, said that the services rendered by the Association's laboratory compare favorably with those available in other countries. The location of the laboratory at the Technion will enable the Association to benefit from the cooperation of scientists working in related fields. In addition to this, the laboratory is expected to serve as a training ground for engineers, chemists and rubber technologists, so vitally needed in the expanding industry.

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המשותף של ממשלות ישראל וארצות הברית
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JOINT PROJECT
UNITED STATES OF AMERICA
ישראל
THIS BUILDING FOR CERAMICS AND RUBBER RESEARCH LABORATORIES WAS
CONSTRUCTED THROUGH THE COOPERATIVE EFFORTS OF THE GOVERNMENTS
OF ISRAEL AND THE UNITED STATES OF AMERICA

This temporary plaque was placed on the new building of the Rubber Research Association indicating the cooperation between the United States and Israeli Governments.

The chairman of the Association, F. Levi, addresses participants at the dedication ceremony. Officials from the United States, Israel and the U.N. were present.

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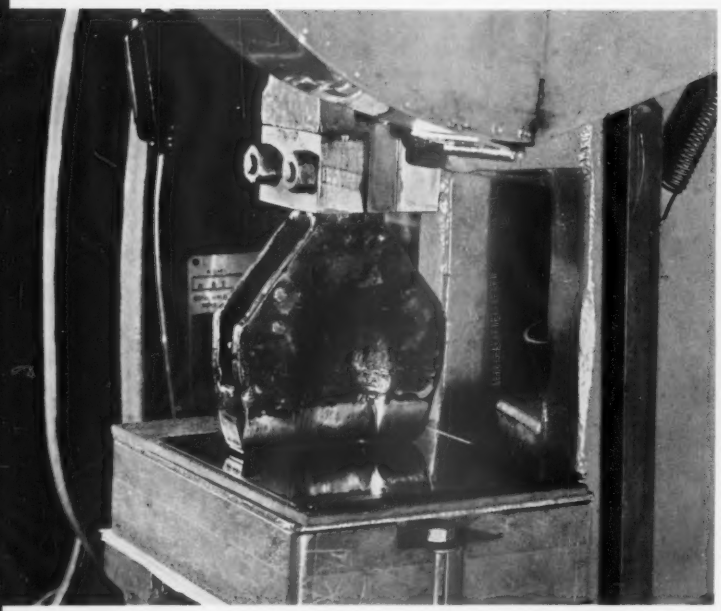

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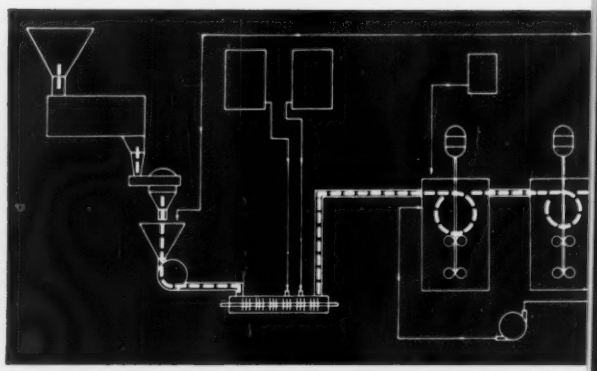

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L. A. Woerner

Named ARco Vice-President

► L. A. Woerner, assistant to the president since 1954, has been named vice-president, technical, for the Automotive Rubber Co., Inc., Detroit, Mich. A native of Adrian, Mich., Mr. Woerner was graduated from Adrian College in 1934 with a B. S. degree in chemistry and later did graduate work at Akron University and the Massachusetts Institute of Technology. He was a member of Carnegie Tech's first "Program for Executives" and is a professional engineer. Mr. Woerner, who has an unusually broad background in the rubber industry has served in all aspects of the field from research and development to actual production administration. He has also been involved in the management of two well known rubber companies. During World War II, Mr. Woerner was technical coordinator for the Goodrich Tire and Rubber Co. and served in the manufacture of synthetic rubber on three Government Committees. He was on loan to R. F. C. as assistant manager of its Research and Development Section, office of Rubber Reserve.

Reorganizes Fisk-Gillette

► Fisk-Gillette Tire Division of the U. S. Rubber Co., New York, N. Y., has been divided into two separate sales, marketing and distribution organizations, in order to provide for more concentrated merchandising effort and better customer service. John A. Boll, formerly sales manager for Fisk-Gillette, has been named sales manager of the new Gillette Tire Division, while L. B. Lillie, former Fisk-Gillette assistant sales manager, has been appointed sales manager of the Fisk Tire Division.

Mr. Boll has been with U. S. Rubber since 1926 and has served in many capacities including those of district manager, branch manager and division manager. Mr. Lillie has been with the company since 1946, when he started as a tire salesman in Boston. In 1948, he became manager of truck tires, tread rubber and repair materials for Fisk and in 1950, he was named district manager in Baltimore. He was appointed assistant sales manager for Fisk-Gillette in 1951.

Develops High Speed Tester

► B. F. Goodrich Co. Research Center, Brecksville, Ohio, has announced that an aircraft engine and high velocity rotor blade has been developed as part of a program to perfect better rubber and rubber-like materials to withstand "sandblasting" action of rain at high speeds. The engine, anchored in a reinforced concrete test tower, spins a rotor-like blade through man-made rainstorms, exposing samples of new de-icer and erosion resistant materials to the impact of raindrops which can be shattering at high speeds.

The company explained that samples of new rubber compounds to be tested are attached to the leading edge of the test tower's rotor blade. Rotation of the blade in a rain atmosphere duplicates rain erosion hazards met in actual flight. Spray nozzles, located near the top of the 35-foot tower, furnish water for the artificial storms. In a 20-foot fall, the stream changes to fully developed raindrops of a controlled size, while technicians observe the tests through a bullet-proof window near the base of the 14-foot diameter tower.

At 600 miles an hour, a fragile raindrop becomes a weapon, striking with the muzzle velocity of a bullet fired from a .45-caliber pistol. Rigid materials, like aluminum or stainless steel, pit when raindrops smash against them at this speed. Droplets scar clear plastic canopies, often opaquing them so that vision becomes completely obscured. Goodrich reported that resilient material like rubber bounces back to shape after such a blow, but large drops can slice into the best rubber compounds now known. The new test tower supplants a smaller facility for rain-erosion testing established at the Research Center in 1950.

Lord Chemlok 607 Adhesive

► Recent tests conducted by the Special Products Division of the Lord Manufacturing Co., Erie, Penna., are said to have indicated that "Chemlok 607" is an excellent adhesive for bonding the new fluorocarbon elastomer, Viton A, to steel, copper, brass, aluminum, titanium, magnesium, chrome-plated steel and other substrates. Chemlok 607 is a clear colorless liquid adhesive for bonding unvulcanized silicone and other synthetic elastomers to metals, fabrics and plastics. According to Lord, it provides excellent adhesion and its versatility indicates a wide variety of applications where a superior bond is required. Viton A, developed by DuPont, is a copolymer of hexafluoropropylene and vinylidine fluoride, said to have exceptional resistance to chemicals and to retain strength at high temperatures. Evaluation tests measured the bond strength of Chemlok 607 with Viton A at temperatures ranging as high as 500°F. The company stated that adhesion after both press and oven cure in almost every case was in excess of the strength of the stock. Tests also indicated that Chemlok 607 could be used successfully to bond Viton A to Dacron and glass fabrics.

George H. Carleu

Joins American Cyanamid

► George H. Carleu has been named a sales representative for the Pigments Division of the American Cyanamid Co. To cover the metropolitan Chicago area, he will have his headquarters in Chicago, Ill. Mr. Carleu, a graduate of Princeton University, joined Cyanamid in 1954 as a sales trainee at the Bound Brook plant. Previous to this, he was associated with the U. S. Rubber Co. in Naugatuck, Conn.

West Virginia Pulp Appointments

► Two sales representatives have been appointed by the Polychemicals Division of the West Virginia Pulp and Paper Co., Charleston, S. C., including Richard C. Feaster, covering the Philadelphia area, and George J. Tazelaar, for the Cleveland area. The appointments were made in line with the company's policy of expanding its technical service field organization and to provide highly trained personnel to work with the firm's customers. Mr. Feaster was formerly with Yale & Towne Manufacturing Co. and the Scott Paper Co. He holds a B.S. in chemistry from Franklin and Marshall University and did graduate work at the University of Pennsylvania. Mr. Feaster was a first lieutenant in the Marine Corps during the Korean conflict. Mr. Tazelaar was formerly with Armour & Co., Chicago, Ill. He is a graduate of Municipal College in the Hague, Netherlands, and did post graduate work at the Vermazen Institute in the Hague. He served in the U. S. Army during the Korean conflict.

Elected to Presidential Post

► Charles A. Polachi, previously a vice-president and director, has been elected president of Columbian Carbon International, Inc., New York, N. Y., and will continue to serve as a director of the firm. A graduate of Holy Cross College, Mr. Polachi joined Columbian in 1955 as foreign sales manager after having been associated with the Binney and Smith Co. for a number of years.

The main railroad station in the city of Cologne had a large sign welcoming those arriving for the meeting of the German Rubber Society on May 7 to 10.

German Rubber Society Holds Fifth Postwar Meeting in Cologne

► Approximately 700 delegates and guests attended the Fifth Postwar Meeting of the Deutsche Kautschuk - Gesellschaft in the Gürzenich in Cologne, West Germany, from May 7 to 10. Chairman of the German Rubber Society, O. Giese, reported that five plenary lectures and 32 technical lectures were presented at the four-day internationally represented conference. G. Fromandi, vice-chairman, and A. Titze, director of DKG, handled the details accompanying the conference that attracted technologists from 24 countries, including the United States, Canada, Great Britain, France, Soviet Union, Italy, Belgium, Sweden, Czechoslovakia, Finland, Norway, Denmark, Indonesia, Liberia, Egypt, Holland, Austria, Switzerland, Mexico and Brazil.

Paper on Carbon Black

H. A. Braendle, G. L. Heller, and J. W. White (Columbian Carbon) presented a paper entitled "The Colloid Phase Carbon Reinforcement of Rubber." In this paper, the authors stated that by recognizing the time factor in colloidal reactions, a significant improvement in the carbon reinforcement of rubber has been effected. Tread wear improvements of 15 per cent over dry mixing have been confirmed, the authors stated. Further study on the process has revealed unexpected processing advantages. The range of processable carbons has been extended to full SAF. The authors said an attempt will be made to rationalize some of these new effects.

"The Influence of the Chemical Nature of the Surface of a Filler Upon its Reinforcing Properties," was presented by M. C. Brooks, F. W. Boggs, and R. H. Ewart (U. S. Rubber), who reported the results of an experimental study designed to establish the effect of the chemical nature of filler surface on reinforcement properties. They said the surface of silica fillers was modified by reaction with organo silanes. It was demonstrated that chemical bonding of filler and elastomer could be achieved, and was necessary to get reinforcement similar to that obtained from carbon black. The chemical bonds between filler and elastomer were achieved through condensation of unsaturated organo silanes on the surface of hydrated silica fillers, and subsequent co-vulcanization of the unsaturated filled surface and elastomer, the authors stated.

Vinyl and allyl unsaturation on the filler surface was found to bring about maximum reinforcement in Hevea and Buna rubbers, but the less reactive cyclohexenyl unsaturation on the filler surface brought about maximum reinforcement in butyl rubber. The reinforcement due to the chemical bonding of filler and elastomer is demonstrated by improvements in performance of vulcanizates containing treated filler when compared to vulcanizates of the same elastomer containing untreated filler.

These improvements in performance are, increased modulus; increased tensile strength, particularly at high temperature; lower permanent set; improved abrasion resistance, better resistance to fatigue, and lower hysteresis. Properly treated fine particle silica fillers were found equal to fine particle carbon black in reinforcement properties, and properly treated kaolin was found equal to the large particle carbon blacks. The authors concluded that practical methods of obtaining these improvements in reinforcement have been developed through the use of compounding agents which react with the surfaces of the fillers during the course of normal compounding. They described these new compounding agents.

In a paper entitled "Rubber Flex Testing with Biaxial Straining," S. D. Gehman and C. S. Wilkinson, Jr. (Goodyear), stated that when rubber is stretched, there is an alignment of the molecules or fibering so that the strength in the longitudinal direction is greater than that in the transverse direction. In some types of service, such as in the sidewalls of tires, rubber goes through complex, two-dimensional cycles of deformation of such a nature that fatigue failure may involve this fibering tendency, the persistance of some fibering for a very short time after retraction, and the fatigue resistance transverse to the direction of fibering, the authors declared.

Exploratory tests were made with a small machine in which a square sheet test piece was mounted and subjected to cycles of extension in two perpendicular directions. The phase of the two motions could be varied by means of cams. The failure originated at a pinhole put in the center of the sheet. The authors reported that alternate stretching in two directions was more severe for fatigue resistance than in-phase, two-way stretching, and much more severe than one-way stretching.

The results were of sufficient interest that a larger, four position machine was built, with such features as temperature control and automatic counting and stopping at the end of a test. Investigations of the fatigue characteristics of rubber undergoing alternate, biaxial straining have been carried out with this machine. The testing procedures were discussed and studies of the effects of testing and compounding variables with this new method of flex testing were presented for some typical rubber compounds, as the authors concluded this paper.

Discusses Friction of Rubber

"Friction of Rubber," a paper presented by V. E. Gough (Great Britain), asserted that the maximum friction of rubber on hard surfaces occurs when there is relative movement between two surfaces. This is true both in slow speed laboratory tests and also in the tire-ground contact area of a tire on the road. Certain practical consequences arise, he said, such as in a belt drive the pulley speed is that of the ingoing belt; in a tire the cornering properties are relatively independent of speed, and these and other facts govern the basic friction relationship which can be assumed. One possible assumption which was discussed by Mr. Gough, led to an explanation of the fact that irregular wear in tires tend to have a pitch constant in distance rather than time.

In a paper by T. A. Riehl and V. F. Giulitto, entitled "Performance Characteristics of Synthetic Rubber in Tires," the authors reported that with the increased use of tires, world-wide, synthetic rubber must, of necessity, play an increasingly important role in order to meet these demands. Projected production estimates of crude rubber for the next several years show no potential increase. We must, therefore, said the authors, depend on synthetic rubber to make possible the

estimated increase for the tire industry during this period. In both the United States and Canada, large amounts of styrene-butadiene rubber have been used successfully for a considerable period of time. On the other hand, in the European market, natural rubber has been used almost exclusively up until quite recently, they noted.

The authors said that with their extensive experience with styrene-butadiene rubber, including oil extended polymers as well as both hot rubber, and cold rubber, they have had the opportunity to evaluate them under many different service conditions. Styrene-butadiene has been used not only successfully, but actually to an advantage in the treads and sidewalls of passenger tires. Here the superior treadwear advantages, resistance to tread cracking, and improved weather aging have all promoted its continued usage. Cold rubber and the more recent oil extended polymers have given particularly outstanding treadwear results, the authors said.

Some disadvantage has been claimed for styrene-butadiene with respect to poorer rolling resistance and traction on snow or ice. The authors said they have been able to combat the former to a certain extent with more recent polymers, as well as the furnace carbon blacks. Although a loss of traction was found at the lower temperatures, the reverse is true under more normal atmospheric conditions and on wet roads styrene-butadiene actually has better stopping ability than crude rubber treads, they said.

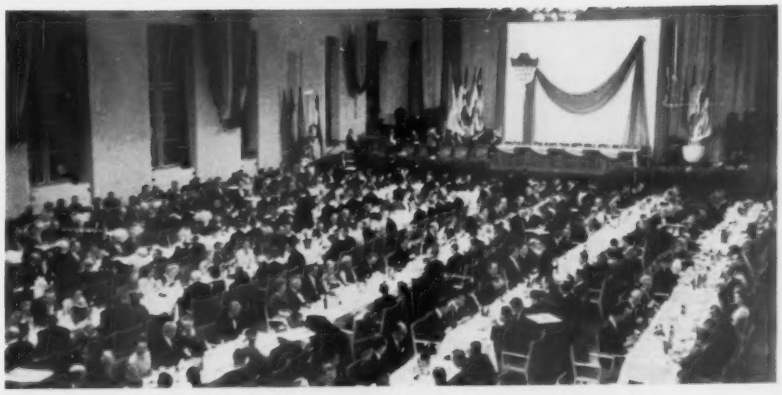
In certain other uses, particularly in carcass compounds, and also in the treads for small truck tires, styrene-butadiene and natural rubber can often be used interchangeably with little effect on tire performance, the authors concluded.

Natural Rubber Discussed

"Natural Rubber Production," a paper presented by A. W. Wallich (Great Britain), dealt with the history, technique, and current problems of the Far Eastern rubber plantations. The differences in estate planting techniques and smallholder's techniques were presented along with the different problems encountered by both in the preparation of the raw rubber for market. Mr. Wallich discussed latex and other special types of natural rubber and how chemistry was changing plantation rubber production into an exacting science.

Mr. Wallich's talk included the statistical present production capacity of the plantations and the steps being taken at the present time to increase this capacity to meet future expected demands. With modern planting machinery, along with extensive replanting and expansion, Mr. Wallich predicted that the future productive capacity of rubber plantations would meet the demand adequately. He concluded that competition from synthetic rubber has been a healthy stimulus for natural rubber producers and that the outlook for natural rubber in the immediate future remains bright.

"Deuterium or Heavy Hydrogen Rubber," was presented by Waldo Semon and David Craig (B. F. Goodrich) who reported that this new synthetic rubber is more "rubbery" than the natural product and has been produced to help scientists find out why rubber possesses its properties. They said that scientific studies of the new material should lead to improvements in the quality of rubber products. In deuterio rubber, deuterium atoms, obtained from heavy water, replace the conventional hydrogen atoms attached to the carbon chains in the molecules of ordinary rubbers. Because molecules containing deuterium atoms attract each other less strongly than do those containing hydrogen atoms, this exchange results in a more fluid elastic rubber.



Historic Gürzenich Hall was the site of the banquet held on May 9.

The authors said a step in the synthesis of deuterio rubber required the preparation of completely deuterated isoprene. They reported that deuterio rubber has many interesting properties and that some may be superior to those of crude rubber. Eventually, a rubber of this type might be made and used for some very special purpose, the authors concluded.

Following is a list of the papers and authors presented at the DKG conference:

May 8: "Petrochemistry and Rubber Synthesis," by Holzrichter — Leverkusen, Germany. "Vulcanization of Styrene-Butadiene Rubber by Gamma Rays," by Arnold, Kraus, and Anderson—United States. "Planning and Construction of the Bunawerke Huls, G.m.b.H.," by Bauman —Marl-Huls, Germany. "Mechanism of Vulcanization," by Dogadkin — USSR. "Production of Buna Huls K in the Pilot Plant," by Engel—Germany. "Calorimetric Measurements of Deformation Heat in Rubber," by Muller—Germany. "Kinetics of Sulfur Vulcanization with Accelerators," by Lorenz—Germany. "Recent Developments in Special Purpose Elastomers," by R. R. Radcliff and M. A. Smook—United States. "The Problem of Measuring Electrostatic Charges," by Umminger—Germany. "The Relation to Temperature of the Mechanical and Stress Optical Behavior of Elastomers," by Kruse—Germany.

May 9: "Activation of Light-Colored Reinforcing Fillers," by Ecker—Germany. "New Ideas on the Aging Problems of Rubber," by J. Le Bras—France. "Investigations on the Tear Strength of Vulcanizates," by Kainradl and Handler — Austria. "The Swelling and Shrinkage of Soft Rubbers," by Luttropp. "The Distribution Force Component and Slip in the Contact Surface of Tires," by D. H. Cooper—United Kingdom. "The Union of Butyl Rubber and Carbon Black," by Edwards and Storey—Canada. "Synthetic Rubbers in the Manufacture of Technical Products," by Burow—USSR. "A Method of Determining the Fitness of Rubber Mixes for the Production of Vulcanizates Free from Sunk Spots," by Eccher—Italy. "Dynamic Behavior of Tires," by Hofferberth—Germany. "The Significance of Free Radicals for the Reinforcing Process," by J. W. Watson and R. Jervis —United Kingdom. "Recent Investigations on Mixing and Dispersing Active Blacks in Natural Rubber," by Westlinning—Germany. "Recent Experiences in the Use of Butyl Rubber in Tires and in Other Rubber Goods." by J. L. Ernst—United States. "Abrasion of Carbon Black-Filled Rubber Compounds," by Vervloet — Holland.

May 10: "New Methods of Recovering Monomers from Latex," by Pech—Germany. "Present Technological Status of Chemical Fibers Developed for the Rubber Industry," by Pieper—Germany. "Influencing the Static and Dynamic Properties of Polyamide and Polyester Cord Yarns by Treatment for Use with Rubber for Vulcanization," by Jehle—Germany. "Effect of the Fiber Structure on the Fatigue Resistance of Rayon Cord," by Keil and Schulz—Germany. "Investigation of Flex Fatigue and Dampening Phenomena of Tire Cord," by Kemnitz—Germany. "A Study of the Frosting Problem in Vulcanizates," by Kluckow and Seeberger—Germany.

Named ARI Technical Director

► George M. Sprowls has been appointed technical director of the American Rayon Institute, Inc., New York, N. Y., with headquarters located at new offices in the First National Tower Building, Akron, Ohio. Mr. Sprowls, formerly manager of the Highway Transportation Division of the Goodyear Tire & Rubber Co., is in charge of the Institute's rayon tire cord research program and a series of field tire testing programs now in progress in various locations across the country.

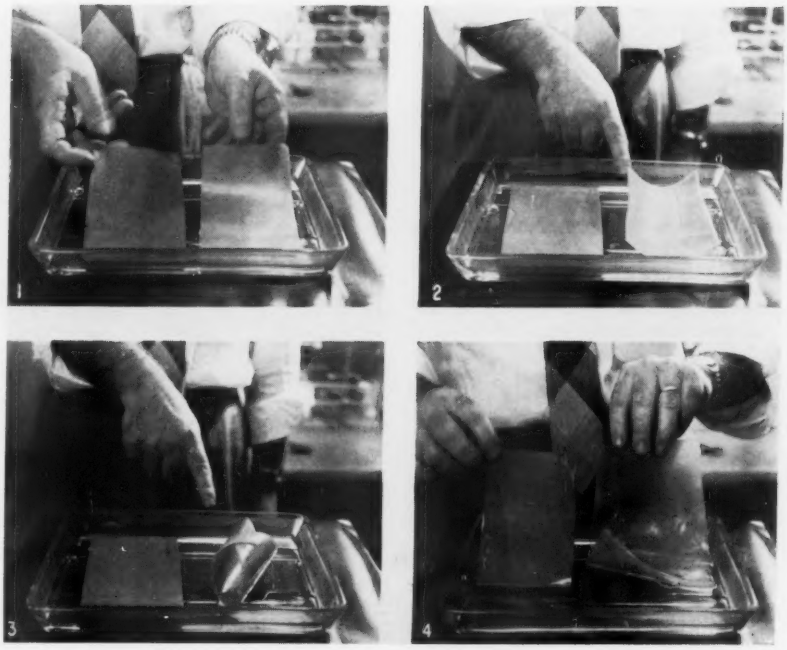
General Electric Introduces Nitrile Silicone Rubber

► Silicone Products Department of General Electric, Waterford, N. Y., has developed a new kind of rubber that combines oil resistance with the ability to maintain strength and usefulness at temperatures ranging from —100°F. to +500° F. Introduced at a press conference in New York City in August, this new nitrile silicone rubber offers industry—particularly the automotive and aircraft industries—a unique combination of important properties never before available in a single rubber, G-E stated.

The company demonstrated how samples of nitrile silicone rubber remained impervious when immersed in hot jet fuels that caused ordinary rubber materials to writhe, curl, and swell into misshapen masses. "High-temperature and low-temperature applications have made silicone rubber justly famous — and invaluable for countless industrial and defense applications," said Dr. Guy Suits, G-E vice-president and director of research. "But ever since the birth of the silicone business during World War II, design engineers have hoped for even more." He said that there has been a growing need for a silicone rubber that is resistant to oil, fuel, and other solvents. It is easy to visualize the number of uses that would be found for a rubber that maintains good physical properties over such a wide temperature range.

Dr. Charles E. Reed, general manager of G-E's Silicone Products Department, stressed that the new nitrile silicone rubber can be processed in ordinary rubber fabricating equipment. He said it will be basically a less expensive material than other rubbers which offer oil- and heat-resistance only at the sacrifice of other important properties. "We believe that the uses of nitrile silicone rubber will be almost unlimited," Dr. Reed said. "The Air Force and the aircraft industry have long sought a material of this type. Many O-rings, seals, and gaskets in aircraft and hydraulic systems are in constant contact with fluids. As aircraft speeds continue to increase, many of the materials now used for these parts will not be adequate to meet the increased temperature requirements.

"The many hoses and couplings that carry fuel, oil, or hydraulic fluids must resist both high and low temperatures as well as the fluids they carry. The aircraft industry has prepared a target specification for a sealant for integral fuel tanks which must withstand temperatures from minus 65 to plus 350°F. So far, to my knowledge, no material has qualified under this specification, but we believe nitrile silicone rubber will do the job," said Dr. Reed.



Sample of ordinary silicone rubber (on the right in each frame) curls, writhes, and becomes swollen when placed in dish of jet engine fuel. The sample on the right, G-E's nitrile silicone rubber remains unaffected because of its resistance to fuels, oils and solvents. The new material also maintains its properties at temperatures ranging from —100 to +500°F.

Potential applications for nitrile silicone rubber are inspected by Dr. Guy Suits, G-E vice president and director of research, and Dr. Charles E. Reed general manager of the Silicone Products Department.

One of the most important automotive applications will be in automatic transmission seals where nitrile silicone rubber will "eliminate the need for compromise" between marginal oil resistance with some materials and marginal heat resistance with others. Differential seals, crank-shaft seals, rubber brake parts, and gaskets also promise to be automotive applications. Other industries cited as potential users of the new material include electrical apparatus, railroads, oil-well operations and many other kinds of lubricated industrial equipment that use gaskets and seals.

Basic chemical research which led to the development of nitrile silicone rubber was performed by Drs. Maurice Prober and Glenn D. Cooper at the G-E Research Laboratory. Describing the research in "polar" silicones which resulted in the introduction of nitrogen in the form of nitrile groups into silicone polymers, Dr. Prober explained, "polar groups strongly attract each other. We felt that these polar groups would radically alter the swelling properties of silicone rubbers in fluids such as gasoline. Many types of nitrile silicone rubbers have been prepared in the laboratory, covering a broad spectrum of properties."

The development of nitrile silicone rubber into a process suitable for commercial production was accomplished by Dr. Ben A. Bluestein and a group of his associates at the G-E Silicone Products Department. Dr. Bluestein described the achievement of a commercially practical and economic method of synthesizing the nitrile-containing silicone. Dr. Bluestein said that an essential part of this synthesis is the fact

that the resulting chemical intermediate must be of extremely high purity—less than one hundredth of one per cent of certain impurities can be detrimental to the properties of the final rubber. This pure nitrile intermediate is first converted to a fluid by hydrolysis and then to a very high molecular weight polymer. The long chain polymer is converted to a rubber by conventional techniques. It is intimately mixed with a filler, like silica, and a vulcanizing agent such as benzoyl peroxide. It is then heated in a mold to produce a rubber.

Other ingredients can be added, such as pigments and coloring agents, which is a quite critical phase of the rubber development. It is the use of the correct type and amount of filler and vulcanizer which results in a material of optimum consistency for subsequent molding and extruding operations and which yields a rubber of optimum properties.

Dr. Bluestein stated that nitrile silicone rubber has a primary property of oil or fuel resistance. Controlled laboratory tests showed the comparative volume increase or swell of a standard silicone rubber and nitrile silicone rubber in three selected fuels. The results of this test showed the reduction in swell of the nitrile silicone rubber by a factor of about 10.

Less striking, but effective results were evident in another laboratory experiment, where swells were given for three types of oil after 70 hours at 300°F. In all cases, the nitrile silicone rubber had only a low degree of volume swell. Similar results are noted at even higher temperatures. In addition to the advantage of being oil-resistant at elevated temperatures, nitrile silicone rubbers, like all commercial silicone rubbers, maintain their strength and rubbery character at a much higher temperature than non-silicone rubbers.

Silicone rubbers are also noted for their low-temperature flexibility, and again the nitrile silicones are no exception. At temperatures where all non-silicone rubbers will become stiff, leathery, or even brittle, the nitrile silicone rubber will remain flexible and elastic.

In a talk outlining the history of silicone rubber, Dr. A. L. Marshall, manager of chemistry research at G-E and a pioneer in silicone research, told how scientists had been seeking an oil-resistant material for many years. He described how the silicone industry was based on a direct process discovered in G-E's laboratories. After tracing the scientific and technological improvements achieved by the silicone industry during recent years, Dr. Marshall stated that the discovery of nitrile silicone rubber is "one of the biggest forward steps yet" in an industry which has had unparalleled growth since it was born in the laboratory less than twenty years ago.

G-E is now building the required facilities at its Waterford, N. Y., plant for the production of nitrile silicone rubber which will have resistance to common oils, fuels and solvents and which will be useful in the temperature range from —100°F. to over +500°F. The company further states that nitrile silicone rubber will be easy to process in ordinary rubber fabricating equipment and that it will be basically a lower cost material than other high-temperature, oil-resistant rubbers. G-E anticipates that the introductory price for low-gravity compounds ready to fabricate will be approximately $15 per pound. Long-term price projections depend largely on the rate at which market demand develops, as has been the case with General Electric silicone prices over the past ten years.

Thomas R. Williams

Consulting Firm Organized

► Formation of International Rubber Manufacturers Consultants, a new organization with offices at 134 Western Ave., Akron, Ohio, has been announced by Thomas R. Williams, chairman. Composed of professional rubber specialists, the services of the new organization will fall into two general categories. One group will handle all consulting engineering services necessary for plant construction, alterations or remodeling. This group is represented by the following consulting engineering firms: Arthur V. Wyatt (architect); David R. Simpson (structural engineering); Lind & Scheeser (mechanical engineering), and Kucheman, Schnabl & Varvaro (electrical engineering). A second group of specialists, all retirees from major rubber companies, will concern themselves with such matters as sales programs and organization, factory organization and management, rubber factory processing and procedures, machine and equipment, design and development, rubber compounding and development, tire construction including design and development, product specifications, and product quality control.

Mr. Williams, chairman of the firm and a registered professional engineer in the State of Ohio, is a graduate of Pennsylvania State University with a B. S. degree in mechanical engineering. In 1935, he joined the Goodyear Tire and Rubber Co. and was with that company's training squadron until 1938. He was associated with the Engineering Department of the B. F. Goodrich Co. from 1941 to 1952, holding key positions in tire design, tire construction and quality control, and became technical superintendent of plant operations at Oaks, Penna., in 1946. Mr. Williams served the Mohawk Rubber Co. from 1952 to 1955, when he joined the Mansfield Tire and Rubber Co. as manager of international plant relations. He resigned from that firm this year to form the new consulting organization.

► Three rubber antiozonants, identified as "Eastozone 30, 31 and 32," are described in a four-page brochure available from Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Co., Kingsport, Tenn.

Introduces Sag Antifoams

► New fast-acting and highly effective foam killers for industrial use, named "Sag" antifoams, have been placed on the market by Silicones Division, Union Carbide Corp., New York, N. Y. The new products come in two forms; "Sag 47 Silicone Antifoam Fluid" for non-aqueous systems, and "Sag 470 Silicone Antifoam Emulsion" for aqueous foaming systems. Handy eight-ounce samples in polyethylene squeeze bottles are being distributed to industries desiring to evaluate these silicone antifoams. Union Carbide said only small quantities are required; somewhere from 10 to 200 parts per million is often all that is needed.

Sag 47 is a 100 per cent solids solution which can be used at full strength, or as a solvent solution, or blended with other materials. It is available in a one-pint, wide mouth jar containing one pound; a one gallon open top can containing eight pounds, and in a five gallon open top can containing 40 pounds. Sag 470 contains 10 per cent silicone solids by weight, and is ready for use, but can be further diluted if desired. It comes in one gallon and five gallon cans and in drums of 55 gallons. Both anti-foams are chemically inert and resist oxidation.

ASQC Plans Buffalo Meeting

► The Second Annual Conference of the Chemical Division of the American Society for Quality Control, to be held on October 2-3 at the Statler-Hilton Hotel in Buffalo, N. Y., will afford an opportunity for technical men to obtain information on the application of statistical methods to chemical industry problems. The conference will feature a number of outstanding speakers in two concurrent sessions covering basic and advanced techniques of statistical methods. A third workshop session will be fashioned in seminar style, with attendance limited to 25 persons. Subjects of the workshop sessions will be the application of statistics to the (1) analytical laboratory, (2) processing operations, (3) subjective testing, and (4) evolutionary operations.

Dayton Forms New Division

► Dayton Rubber Co., Dayton, Ohio, has announced plans to form a Molded Products Sales Division with a plant at Three Rivers, Mich., to produce molded rubber products. Clowes Christie, president of the firm, states that plans call for development of new elastomers and research and development in the vibration control field.

Select Committees for 50th Anniversary of Rubber Chemistry Teaching at the University of Akron

► Six major Akron rubber industry leaders have been named to an Honorary Committee for the University of Akron's 50th Anniversary of the Teaching of Rubber Chemistry commemoration ceremonies. As reported in the August, 1958 issue of RUBBER AGE, all day ceremonies will be held on the University campus on Friday, October 3 to celebrate the occasion.

The Honorary Committee, which will consist of the board chairmen of some of Akron's leading rubber companies will include Paul W. Litchfield (Goodyear) as chairman, and John L. Collyer (Goodrich); Harvey S. Firestone, Jr. (Firestone); William O'Neil (General Tire); J. P. Seiberling (Seiberling) and R. E. Bloch (Mohawk).

Harry P. Schrank, general chairman of the Akron University organizational committee and executive vice-president of the Seiberling Rubber Co., has also appointed two other committees for the half-century observance. Serving with Mr. Schrank on the organizational committee are Dr. Norman P. Auburn (Akron University); Lawrence M. Baker (General Tire); George W. Ball (Akron University); Dr. Ernest H. Cherrington, Jr. (Buchtel College); Dr. Otis Cole, (Firestone); Dr. James D'Ianni (Goodyear); Dr. Maurice Morton (Akron University); Dr. Waldo Semon (Goodrich), and Dr. Thomas Sumner (Akron University).

Mr. Schrank, who is also a member of the Akron University board of directors, has asked Hurl J. Albrecht, University board chairman, to pledge the support of the entire board to the program. These members, all on a separate committee, are L. S. Buckmaster (International URCLPWA, AFL-CIO), Mrs. Walter A. Hoyt; Attorney Lee Ferbstein; Charles J. Jahant (General Tire); J. Ward Keener (Goodrich); E. J. Thomas (Goodyear), and Joseph Thomas (Firestone).

In addition, four faculty subcommittees have been selected for the event. These committees along with those named above will be responsible for the administration of the anniversary ceremonies.

Dr. Ernest H. Cherrington, Jr., dean of Buchtell College of Liberal Arts, has been named chairman of a committee for the Morning Convocation to be held in Memorial Hall. Serving with Dr. Cherrington are D. H. Gardner, dean of Administration; Dr. Ray H. Sandefur, head of the Speech Department, and Dr. Paul Fall, professor of chemistry.

Dr. Vaughn W. Flotz, associate professor of chemistry, will serve as chairman of the committee for the luncheon and evening banquet. On his committee are John M. Denison, director of Alumni Relations; Dr. Noel Simmons, assistant professor of chemistry, and Mary Wilson, assistant professor of home economics.

A symposium that will feature three national figures in the rubber chemistry field will be presided over by Dr. Maurice Morton, director of the Institute of Rubber Research. Assisting Dr. Morton are Dr. Gerald Corsara and Dr. Alan Rembaum, both of the Chemistry Department.

The last committee which will help to coordinate the Rubber Science Hall of Fame details with the American Chemical Society, is headed by Dr. Thomas Sumner, head of the Chemistry Department, and includes Dr. Walter A. Cook, professor of chemistry, Dorothy Hamlen, librarian; Dr. Morton, and Dr. G. Stafford Whitby, professor emeritus of rubber chemistry.

It has also been announced that Dr. Alan T. Waterman, director of the National Science Foundation (NSF), Washington, D. C., will be the principal speaker at the evening banquet. Dr. Waterman is a graduate of Princeton University, where he received his A.B. degree in 1913 and his Ph.D. in physics in 1916. Before he joined NSF, he was with the Office of Naval Research as deputy chief and chief scientist. During World War II, Dr. Waterman served as an assistant member of the National Defense Research committee, first as deputy chief and later as chief of the Office of Field Service, Offices of Scientific Research and Development. He was awarded the Medal of Merit in 1948 for his war work with the office of Scientific Research and Development. In 1957, he was presented with the first annual Captain D. Conrad Award, established by the Office of Naval Research, "in recognition of and reward for outstanding technical and scientific achievements in research and development for the Navy."

Alan T. Waterman

Dr. Waterman has also conducted research investigations in the field of conduction of electricity through solids; thermionic photoelectric emissions and allied effects, and electrical properties of solids. He serves as chairman of the Interdepartmental Committee on Scientific Research and Development and is a member of the Distinguished Civilian Service Awards Board, the Defense Science Board of the Department of Defense, the Committee on Specialized Personnel of the Office of Defense Mobilization and is a consultant to the President's Science Advisory Committee.

Detroit Rubber Opens Laboratory

► An enlarged and improved laboratory has been installed by Detroit Rubber Co., Detroit, Mich., in order to provide customers with the latest devices for maintaining strict laboratory control. Organized in 1950, the company manufactures industrial parts designed for engineering needs. It specializes in adhesion of rubber to metal parts. The firm works with the newest heat and fluid resistant elastomers, manufactures prototypes and turns out parts to ASTM and military specifications.

Denies Price-Fixing Charge

► Firestone Tire and Rubber Co., Akron, Ohio, has denied federal charges that the company gives illegal price concessions to favored customers. According to the company, when discounts have been given, they have been fair and reasonable. The Federal Trade Commission has accused the firm of classifying a few of its big buyers as warehouse dealers and giving them price reductions not available to other dealers, thereby violating the Robinson-Patman Amendment.

Southern Latex Named Alco Agent

► Alco Oil and Chemical Corp., Philadelphia, Penna., and Southern Latex Corp., Madison, N. J.; Austell, Ga., and Concord, N. C., have announced that Southern Latex will sell, distribute and provide technical service on Alco's thickeners and chemicals in the Southeastern States. Southern will maintain adequate stocks of Alco's Alcogum thickeners, Vulcacure accelerators and antioxidants, and Warp Sizes at Austell, Concord and Dalton, Ga.

Fort Wayne Plant to Close

► U. S. Rubber Co., New York, N. Y., has announced that it will close its industrial rubber products plant in Fort Wayne, Ind., which has been operating without a profit for a number of years. Approximately 700 employees will be affected by the closing which will be accomplished gradually over a period of about four months. Company officials said that since purchase of the Fort Wayne facility in 1946, the plant has operated unprofitably except during the Korean War period when it had the benefit of government contracts. According to U.S. Rubber, the plant has suffered severe competition from many smaller manufacturers producing similar products, while it has consistently paid higher wages than its competitors.

Louis J. Healey, vice-president and general manager of the Mechanical Goods Division, said, "the current recession has been particularly severe in industrial rubber products and the company now has idle floor space available in several other plant locations which can be used to better advantage for many of the products now being made at Fort Wayne. Hence the move must be made to protect the earning power of the company and thus the jobs of all other employees. It is our only course of action." The company plans to transfer production machinery and equipment from Fort Wayne to its plants in Chicago, Ill., Mishawaka, Ind., and Passaic, N. J.

Named Service Representative

► J. W. McCarthy has been appointed technical service representative for the Marketing Department of Jefferson Chemical Co., Houston, Texas, a jointly owned subsidiary of American Cyanamid and the Texas Co. In his new position, Mr. McCarthy will be responsible for servicing customer accounts and assisting in maintaining and developing market outlets. He is being transferred from the Manufacturing Department of the firm where he has been a process engineer for the past year. Prior to joining Jefferson, Mr. McCarthy was employed by the Phillips Chemical Co. and the Civil Engineering Corp. He holds degrees in chemistry and chemical engineering from the Texas College of Arts and Industries and received an M.S. in Chemical Engineering from the University of Oklahoma.

Named Industrial Sales Manager

► William A. Baltzell, formerly assistant sales manager, has been appointed industrial sales manager for Oakite Products, Inc., New York, N. Y. In his new position he will be responsible for the work of the company's seventeen divisions and two hundred and forty technical service representatives throughout the U. S. and Canada. Mr. Baltzell joined Oakite's field service staff in 1951. He was appointed Southern Division manager in 1946, and became assistant sales manager in 1953. He is a member of the board of directors of the company.

Washington Rubber Group Outing

► The Washington Rubber Group held its annual summer outing on June 27 at the Bethesda Country Club, Bethesda, Md., with 120 members and guests in attendance. Events featured were golf, swimming, horseshoes, dinner and dancing. Door prizes were also distributed. The outing was chaired by Thomas A. Tharp (General Tire), assisted by Daniel Pratt (Navy Bureau of Ships), *Tickets;* James Sears (RMA), *Golf,* and John J. Egan (International B. F. Goodrich) and Charles R. Collins (Goodrich), *Prizes.*

Golf winners were Leland E. Spencer (Goodyear-Canada), Low net, Washington Rubber Group Trophy; Richard E. Vernor, runner up low net, Belko Trophy; John W. Powless (Carlisle Tire), low gross, Soctex Trophy; Leland E. Spencer, runner up low gross; Mrs. W. J. Sears, ladies low net; Mrs. Marjories Rice, ladies runner up low net; Mrs. L. E. Spencer, ladies low gross.

Develops Polymerization Bath

► An improved polymerization bath, which enables simultaneous polymerization of up to 32 experimental monomer formulas, has been developed by the Hunter-Bristol Division of Thiokol Chemical Corp., Trenton, N. J. The company used urethane to effectively insulate this device to maintain constant temperature during experimentation. The lightness of this urethane insulation eliminates the need for auxiliary devices to open a heavily insulated cover. Improved electrical engine design and mountings minimize the amount of vibration in the laboratory in the operation of this machine. A new closure design has facilitated safety and speed in removing experiments. The company said that complete safety in polymer experimental work is assured through the heavy construction and insulating arrangement, while the amount of space required is no greate. than that required with previous equipment of this nature.

Pressurized Rubber Balls Part of Army's Jupiter C

► A series of rubber balls, each about the size of a basketball yet tough enough to contain 269 tons air pressure, are part of the pneumatic trigger system for the first stage rocket of the Army's Jupiter-C missile that launched the Explorer satellite into orbit. The spheres, reinforced with glass and resin, are made from a synthetic rubber which forms a virtually impenetrable barrier to air and most other gases, even under extreme pressures. Developed by B. F. Goodrich Industrial Products Co., Akron, Ohio, a layer of the new rubber compound less than one-eighth inch thick stops air leakage even at pressures up to 3,000 pounds per square inch.

Manufactured in halves, the rubber hemispheres are shipped to Apex Reinforced Plastics Co., which bonds the halves with a Goodrich adhesive and reinforces the balls by winding them with a continuous cord of epoxy resin-impregnated glass fiber yarn. Reinforced in this manner, the "air storage bottle" survives a 30-foot drop to concrete, rebounding to a height of 30-feet on the first bounce. Goodrich officials

claim that no other application in industry or elsewhere has ever subjected a rubber material to such critical operating pressures. Conventional rubbers blister and blow apart under high pressures as air is literally blasted into their structures. The photograph shows one of the 15-inch, three and one-half pound rubber spheres before the fiber coating operation.

Goodyear Introduces New Off The Road Truck Tire

► A new off the road truck tire, squared off and widened in the shoulder area to give improved wear and traction, has been developed for construction work by the Goodyear Tire & Rubber Co., Akron, Ohio. Named the "Super Hard Rock Lug", the tire is made in all wide-base sizes, and is available in tubeless and tube-types. It is built with special cut-resistant rubber compounds and Goodyear's triple tempered 3-T nylon cord. Company officials said that the added rubber in the deepened and widened shoulder area provides increased ground contact, which results in a stronger bite, longer wear and resistance to shoulder snags and cuts. The Super Hard Rock Lug is available for nationwide distribution in the following sizes: 23.5—12, 16 and 20-ply rating; 26.5—20 and 26 ply; 29.5x25—28 ply; 29.5x29—22, 28 and 34 ply, and 33.5x33—26, 32 and 38 ply.

Shown from left to right are Forrest B. Shaw, newly elected president of Rubbermaid, Inc.; James R. Caldwell, retiring president and newly elected chairman of the executive committee of the board of directors, and Donald E. Noble, newly-elected executive vice-president in charge of finance.

Rubbermaid Changes Executive Staff

► Forrest B. Shaw, formerly vice-president and assistant general manager, has been elected president and general manager of Rubbermaid Inc., Wooster, Ohio, succeeding James R. Caldwell, president and founder of the organization, who will continue as chairman of the Executive Committee. The board has also announced the election of Donald E. Noble, previously vice-president in charge of finance, as executive vice-president in charge of finance. J. Richard Raeder has been promoted to controller and will be succeeded as assistant treasurer by Thomas G. Clark.

Mr. Shaw began his career with the Goodyear Tire and Rubber Co. in 1925 as a member of the Production Training Squadron and later, was one of the group selected to start the company's Gadsden, Ala., plant. In 1929, he returned to Akron to handle various assignments and to serve as an instructor at the Goodyear Industrial University. He was chosen to head a division for control and distribution of Bullet Seal Tanks for all Goodyear plants in 1941. Mr. Shaw joined Rubbermaid, then the Wooster Rubber Co., as production manager in 1945. He was named vice-president and assistant general manager in 1957.

J. Richard Raeder

Thomas G. Clark

Mr. Caldwell founded the company in the middle depression years, when he designed a rubber dustpan and peddled it door to door in Connecticut. Meeting success, he formed the Wooster Rubber Co. in Wooster, Ohio, in 1934. Earlier this year, the corporate name was change to Rubbermaid, Inc. Mr. Noble, a graduate of Western Reserve University, was associated with the National City Bank of Cleveland before joining Rubbermaid in 1941 as assistant office manager. He was elected assistant treasurer in 1941, became secretary-treasurer in 1942 and was named vice-president in 1956.

Mr. Raeder is a graduate of Western Reserve University with bachelor's and master's degrees. He joined the company in 1954 as chief accountant and was elected assistant secretary-treasurer in 1955. Mr. Clark is a graduate of Gettysburg College and holds a master's degree in business administration from the Wharton School of Commerce at the University of Pennsylvania. Before he joined Rubbermaid, he was associated with Firestone.

ISA Plans Two-Day Meeting on Rubber Instrumentation

► The Second National Rubber and Plastics Instrumentation Symposium, co-sponsored by the Instrument Society of America and the Society of Plastics Engineers, will feature four technical sessions on October 20 and 21 at the Sheraton-Mayflower Hotel in Akron, Ohio. Social events planned for the two day meeting include a luncheon at 12 noon, and a cocktail party at 6 P.M., both on October 20. Cocktails will also be served on October 21, at 6:30 P.M., followed by dinner, at 7:30 P.M., at which E. Paul Morehouse (Goodyear) will speak on "Automation—Key to Productivity."

James E. Trainer (Firestone) will open the first technical session at 9 a.m., October 20, with a keynote address, followed by:

"Nuclear Magnetic Resonance and the Structure of Polymers", by Dr. Richard H. Sands (University of Michigan).

"Base Line Control on Gas-Liquid Chromatography" by Lloyd V. Guild (Burrell).

The afternoon technical session will begin at 1 P.M. and will include the following papers:

"The Measurement of the Rheological Properties of Polymers" By Walter T. Blake (C. W. Brabender).

"Nuclear Magnetic Resonance and It's Applications to Polymers", by Dr. R. S. Codrington (Schlumberger).

"Applications of Gas Chromatography", by H. N. Claudy (Perkin-Elmer).

"Applications of Infrared Analyzers", by L. E. Mailey (Mine Safety Appliance).

The third session will begin at 9 A.M. the following day. Papers scheduled for this session are:

"Nuclear Measurements and Process Control in the Rubber Industry", George V. Doering (Industrial Nucleonics).

"Application of Automatic Data Handling to the Rubber and Plastics Industry", by J. T. Teed (Minneapolis-Honeywell Regulator).

"High Frequency Dielectric Heating and Drying of Rubber and Plastics", W. H. Hickok (Girdler).

At the afternoon session, beginning at 1 P.M., the following papers will be featured:

"Programmed Control as Applied to Aircraft Tire Testing", by Harold P. Lamb (Adamson-United).

"Differential Transformer Gaging in the Rubber and Plastics Industry", by W. D. Macgeorge (Automatic Timing).

"Fundamentals of Weighing and Recent Developments", by Robert E. Bell (Toledo Scale).

"Magnetic Thickness Gages in the Rubber Industry", by W. R. Baarck (Pratt & Whitney).

Registration will take place at 8 A.M. each day prior to the morning technical sessions.

► A complete and up to date reference source on wood tanks, called the "Wood Tank Reference and Data Handbook," has been published by the National Wood Tank Institute, Chicago, Ill.

Forms Italian Company

► A new company, called Naugatuck-Rumianca, S.p.a., has been formed jointly by U. S. Rubber Co. and the Rumianca Co. of Turin, Italy, to manufacture and sell a line of chemical products developed and manufactured by the Naugatuck Chemical Division of U. S. Rubber. The new company will have its headquarters in Turin and its manufacturing plant in Borgaro Torinese, a suburb of Turin. Among the products it will make and sell are accelerators and antioxidants for the rubber industry, a group of agricultural chemicals, and a series of chemical specialties. Until the new firm's manufacturing plant is erected, Naugatuck-Rumianca plans to import and sell in Italy all of Naugatuck Chemical products. Rumianca has been a chemical producer for more than 40 years. Its products include heavy chemicals, industrial chemicals, and fertilizers. The products to be made and sold by the new firm will supplement Rumianca's present line, and enable them to provide a full selection of chemicals for Italy's growing rubber and agricultural industries. Product know-how and technical assistance in constructing and starting up the new plant will be provided by U. S. Rubber. The new Italian plant's technical personnel will be trained at the main plant of the Chemical Division in Naugatuck, Conn.

Introduces Harflex 375

► Harchem Division of Wallace and Tiernan, Inc., Belleville, N. J., has announced the development of "Harflex 375", a polymeric plasticizer. According to Harchem, Harflex 375 is almost completely resistant to extraction by soapy water or solvents and guarantees maximum resistance where plasticized vinyl resins may come in contact with lacquered or varnished surfaces or other plastics. It is also said to have the best low temperature flexibility obtainable in a true polymeric plasticizer and excellent aging both at high temperatures and in sunlight. The new material is soluble in ketones, benzene, carbon tetrachloride and ethyl acetate; partly soluble in alcohols, petroleum ether, and gasoline, and insoluble in glycols and water. Harflex 375 is compatible with vinyl chloride polymers and copolymers, nitrocellulose and synthetic rubbers; partly compatible with polyvinyl acetate, polymethyl methacrylate and incompatible with polystyrene, cellulose acetate, ethylcellulose, and cellulose acetobutyrate.

Pittsburgh Coke Expands

► Industrial Chemicals Division of the Pittsburgh Coke & Chemical Co., Pittsburgh, Penna., has announced the expansion of its plasticizer production capacity by 50 per cent. The added capacity, now on stream, follows the company's recent 100 per cent increase in phthalic anhydride capacity. Phthalic anhydride is a basic raw material of phthalate plasticizers alkyd resin paints, polyester resins and phthalocyanines.

Captive Air Safety Tire

► Goodyear Tire and Rubber Co., Akron, Ohio, has announced that its new "Captive Air Safety Tire", has practically eliminated roadside tire changes by the incorporation of steel cord armoring. The new development, called the "suit of armor", consists of a two-ply layer of steel cord nested between two plies of nylon cord to make up the new tire's protective inner shield, or built-in "spare-tire". This results in a tire with two separate air chambers which keeps going for 100 miles or more even if the outer chamber is ruptured and loses its supply of air. The car then rides on the inner tire's reserve air. Before the steel wire reinforcing was added, large nails, in rare cases, could work through both the tire tread and the inner shield. With the steel wire shields, ordinary nails are bent over harmlessly before they can pierce the inner chamber, the company explained. Incidence of a disabling flat tire is now said to be less than one in a million tire miles, or less than one in ten years of driving. Made with 3-T nylon cord, and available in a full range of 14 and 15 inch sizes, black or white sidewall, tubeless, the new Captive-Air Safety Tire is being distributed nationwide.

Introduces Two New Products

► Silicone Products Department of the General Electric Co., Waterford, N. Y., has added to its standard product line two new vinyl-modified silicone gums for use in the formulation of Class 500 or extreme low temperature service silicone rubber compounds. "SE-53" is a standard shrinkage polymer, while "SE-54" is said to be the only low shrinkage, extreme low temperature reactive silicone gum now on the market. Because these gums are vinyl-modified, ultimate physical properties of the compounds based on them can be obtained with curing cycles shorter than normally required. Other features are the realization of excellent compression set properties without the use of toxic additives and reduced levels of curing agents. According to the company, the two new products are of particular interest in the compounding of silicone rubber for use in the aircraft industry and other applications where good performance over the —150° to 500° F. temperature range is required. The quality of both gums is controlled during manufacture to obtain uniform handling and production characteristics and both are furnished under General Electric's Certified Uniform program.

Stalwart Extruded and Calendered Silicone Sponge

► Stalwart Rubber Co., Bedford, Ohio, has perfected what is said to be an exclusive technique which permits extrusion and calendering of complex silicone sponge shapes. Extruded silicone sponge cross-sections are available in long lengths, continuous lengths, coils and rolls, and sheets of silicone sponge measuring up to 36 inches in width, can be combined with Orlon, Dacron, nylon, fiber glass and other heat resisting fabrics. Stalwart silicone sponge parts have a temperature resistance ranging from —160 to +500° F, are said to provide unparalleled resistance to aging, sunlight, ozone, oils and chemicals and to have excellent dielectric qualities at extremely high temperatures. According to the company, lower equipment costs and high-volume production economies in extruding and calendering silicone sponge provide customers with sharply reduced production costs. Density, cell size and configuration are scientifically controlled by Stalwart to produce sponge cross-sections to close dimensional tolerances that meet individual requirements. This extruded and calendered silicone sponge complies with sponge standards established by the Rubber Manufacturers Association, the company states.

Develops Manveyor Belt

► Hewitt-Robins, Inc., Stamford, Conn., has developed what is believed to be the first belt conveyor ever installed in a mine to carry personnel exclusively. Named "Manveyor", the belt was designed to transport workers to and from the mine at the Johnstown Coal & Coke Corp. Panther Gulch, West Va., facility. The new belt, 450-feet long and 26-inches wide, extends from the mine entrance down a 20-degree slope to the mining area, a 97-foot drop in altitude. Manveyor was installed in this mine pit after engineering studies indicated it would be more economical and faster than an elevator.

Nylon Cord Tire Sales Increase

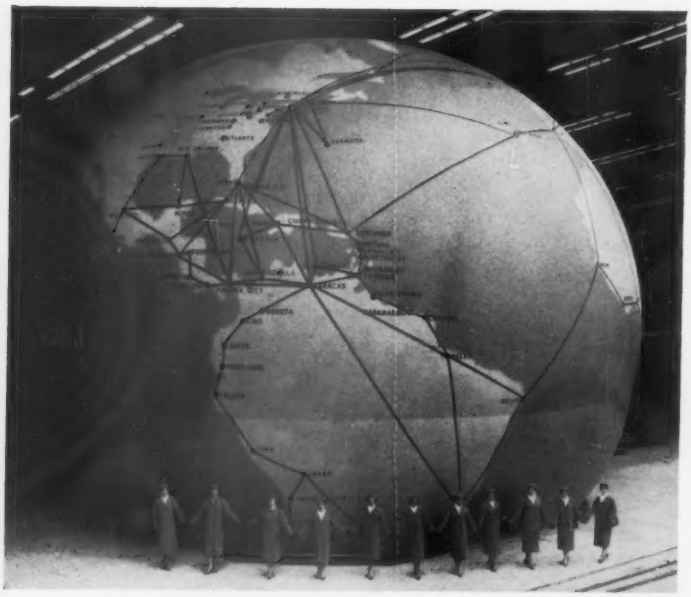
► A report by the Vanderbilt Tire and Rubber Corp. indicates that nylon cord tires accounted for 60 per cent of its tire sales during the first quarter of 1958. The company states that it expects a further increase in sales of nylon over rayon during the remainder of the year and foresees an average of 65 per cent nylon sales in the current year. In 1957, Vanderbilt's sales of nylon cord passenger tires represented slightly more than 50 per cent of its total passenger tire sales. The company's premium tires are 100 per cent nylon, and nylon cord tires constitute a major portion of its economy line.

New Facility Under Construction

► Dewey and Almy Chemical Co., a division of W. R. Grace & Co., Cambridge, Mass., has begun construction of a new battery separator and organic chemicals plant at Owensboro, Ky. The modern plant will occupy a 143-acre tract located three miles east of Owensboro. Four major buildings, which will total more than 80,000 square feet of floor space, are under construction: an office and warehouse building; a battery separator building; an organic chemicals reactor building, and an organic chemicals storage building.

The battery separator plant is slated for completion late this year and the organic chemicals plant, early in 1959. Planned battery separator production lines will increase the firm's capacity for resin-impregnated insulators used between the plates of automobile storage batteries. In organic chemicals, the facility will more than double Dewey & Almy's capacity for vinyl acetate polymer and copolymer emulsions, and styrene-butadiene latices for the rubber paints, paper, textile, and adhesives industries. In addition to boosted production for national markets, the new plant will permit overnight delivery to many of the company's customers in the Midwest and South. The company planned and began construction of the Owensboro plant because steady increase in demand for both products promised to outstrip existing capacity.

Fiberthin Globe Shown At Brussels Fair



► One of the exhibitions featured at the Brussels World's Fair, which began in April, is a huge air-filled globe made of "Fiberthin", a vinyl-coated nylon fabric developed by the U. S. Rubber Co. Manufactured for Pan American Airlines by the Irving Air Chute Co., Lexington, Ky., the globe stands 42 feet high, is 52 feet in diameter and requires 70,000 cubic feet of air when inflated. Deflated, it can be packed in an 8 x 6 x 6 foot box. Approximately 1000 yards of Fiberthin were utilized to make the globe. The material is said to be four times as strong as waterproof canvas and 40 per cent lighter in weight.

Contracts To Build Japan Unit

► A contract to design and engineer a synthetic rubber plant in Japan has been awarded to the Blaw-Knox Co., Pittsburgh, Penna., according to current reports. The $30 million unit, to be constructed near Yokkaichi, will have an annual capacity of 45,000 long tons of synthetic rubber material. Blaw-Knox will design and engineer facilities for feed material preparation, butadiene production and extraction, copolymerization and necessary supporting facilities. Basic engineering design will be handled in the company's Pittsburgh offices. After the engineering data is shipped to Japan, a company field staff will manage the project during engineering, construction and initial operation. Blaw-Knox did not disclose the dollar value of the engineering and design work it has been awarded.

Hatfield Wire & Cable To Build New Cable Manufacturing Unit

► Hatfield Wire & Cable, a division of Continental Copper & Steel Industries, Hillside, N. J., has announced plans to build a new $3½ million plant in Linden, N. J., for the manufacture of rubber covered wire and cable. The 300,000 square foot plant will be located on a 62 acre site, bounded by Stiles St., St. George Ave., W. Blancke St. and Fuller Road, which was acquired last fall. Construction of this facility is part of an expansion program which has included work at facilities in Union and Braeburn, N. J., and Hannover, Penna. After completion of the Linden plant, the Hatfield factory at Hillside will be streamlined and operated as a plastic insulation unit. The new unit will be financed through the use of capital obtained by the sale of Continental's Wooldridge Division at Sunnyvale, Calif., to the Curtiss-Wright Corp. Sale price of this division was "in excess of five million dollars", according to Mortimer Gordon, president of the firm.

Plant Expansion Completed

► A $700,000 expansion program, including construction of a new warehouse and additions to production facilities, has been completed by the B. F. Goodrich Industrial Products Co. at Marietta, Ohio. The new warehouse adds 72,000-square feet of floor space to a plant that produces such Koroseal vinyl products as upholstery, wall covering, garden hose, rigid pipe and sheet, flexible material for rainwear, luggage, shower curtains and a variety of other products. Company officials stated that the new warehouse further centralizes the firm's shipping operations and makes available new manufacturing areas formerly used for storage.

Four Technical Sessions Planned For TAPPI Meeting

► The 13th Plastics-Paper Conference of the Technical Association of the Pulp and Paper Industry has been scheduled to be held at the Sheraton-Kimball Hotel, Springfield, Mass., from October 20 to 22, 1958. The meeting will be broken up into four half-day Technical Sessions which will be devoted to presentations on thermoplastic resins, thermosetting resins, extrusion coating with nylon and polyethylene, and fundamentals of fiber-plastics combinations.

Arthur Bronwell, president of Worcester Polytechnic Institute, will address the delegates at the official conference banquet on the subject "Can We Maintain a Philosophy of Progress?" On October 22, Monsanto Chemical Co. in Springfield, and Strathmore Paper Mills in Woronoco, will receive the delegates as visitors to their plants. W. N. Stickel (Texon) is in charge of local arrangements for the conference and is being assisted by G. E. Martel (Texon), A. G. Magrath (Plastics Coating), and G. I. Reece (Westfield River Paper).

"Extrusion Coating of Linear Polyethylene on Paper," is the title of the first Technical Session which is scheduled for the morning of October 20. H. A. Arbit (Bakelite) has been named chairman of this session at which the following papers will be delivered: "Equipment For Extrusion Coating," by J. Melead and J. E. Nordgren (Black-Clawson); "Forming Containers From Polyethylene Coated Board," by J. R. Sonneborn (Food Machinery Corp.), and "Markets and End Use Applications for High Density Polyethylene/Paper Combinations," by A. J. Dragonette (Bakelite).

H. Spector (Permoid Corp.) was appointed chairman of the second session, entitled "Performance of New Paper-Thermoplastic Resin Combinations." An address by R. C. Hoch (Endura Corp.), entitled "Mechanics of Latex Saturation," has been scheduled for that session. The third session, entitled "Performance of New Paper-Thermosetting Resin Combinations," will be chaired by P. M. Goodloe (Brown Co.). "Study of Curl in Decorative Laminates," by W. E. Morris (Allied Chemical), is the paper to be presented at that time. "Fundamental Aspects of Fiber-Plastics Combinations" is the title of the fourth session which will be presided over by T. A. Howells (Institute of Paper Chemistry). W. J. Hamburger (Fabrics Research Laboratories) will address that session on the topic of "Engineering Design of Fiber Structures."

Velsicol Names Burns

► Resins and Solvents Division of Velsicol Chemical Corp., Chicago, Ill., has appointed W. H. Burns to the newly created post of eastern regional manager with headquarters in New York, N. Y. Mr. Burns has nine years of experience as a product development chemist and eastern sales representative for Velsicol. He holds a degree in chemical engineering from the Illinois Institute of Technology.

Goodyear Presents Animated Exhibit

► An animated exhibit showing the scope of the Goodyear Tire and Rubber Co., Akron, Ohio, and the various products it manufactures, has been installed at the visitor's gallery of the New York Stock Exchange. Highlighted by the Goodyear symbol, "Tire Around the World", the exhibit has a slowly revolving spiral tape on which are listed 1957 financial facts about the company, and an edge lighted world map showing the location of Goodyear's plants throughout the world. Another part of the exhibit represents six television viewing screens, each with color pictures of the company's products in use. Also featured at the exhibit is an animated demonstration of the company's Captive-Aire tire. Shown above are P. E. H. Leroy, Goodyear executive vice-president (foreground) and G. Keith Funston, president of the New York Stock Exchange, as they inspect the display, which will be open throughout the remainder of 1958.

General Tire Names Two

► General Tire & Rubber Co., Akron, Ohio, has announced that Chester A. Hill has been named treasurer succeeding Tracy S. Clark, who retired on June 30 after 22 years as an officer of the firm. At the same time E. W. Lutz, formerly general credit manager, has been promoted to assistant treasurer of the company. Mr. Hill was graduated from the University of Illinois in 1930 with a B.S. degree and has been a member of the treasurer's department at General Tire since 1945. Before joining the firm, he was employed by White Motor Co., Cudahy Packing Co., and Arthur Anderson & Co. He is a native of Lead, S. D., and a member of the American Institute of Certified Accountants. Mr. Lutz started with General Tire in 1931 as credit manager of the Minneapolis, Minn. branch and was later shifted to New York where he became Eastern and New England Division credit manager. He was named general credit manager in 1950. Mr. Lutz, a native of Bellefontaine, Ohio, attended Western Reserve University and the Cleveland School of Business Administration. He is a member of the National Association of Creditmen and the Tire Manufacturers Credit Association of New York.

AEC Releases Sales Guide

► The latest revised edition of *Selling to (the) AEC*, a 34 page booklet which briefly describes the Commission's procurement program, has been released by the Atomic Energy Commission. Replacing the January, 1956 edition, the booklet lists the types of service and items purchased by the AEC including a list of 84 classes of products, and shows the names of the agencies and individuals in charge of the purchasing. The booklet is divided into four parts. Part I describes the organization of the Commission and its method of procurement; Part II is a directory of the procurement offices including the names of the purchasing agents; Part III shows 84 classes of products normally purchased for the Commission and by whom, and Part IV is a brief summary of the "Atoms for Peace" program and some of its areas which will be of interest to industry. Included in the publication, as appendices, are a current list of the Commission's construction contractors; an up-to-date listing of the principal architect-engineer contractors, and a bidders mailing list application. The publication is priced at 25c and is available through the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Names in the News

C. Burke Miles has been named assistant research director of the Inorganic Chemicals Research & Development Department of the Food Machinery and Chemical Corp., New York, N. Y., while **Robert L. McEwen** and **Fred R. Sheldon** have been named manager of development and general manager, respectively, of the Applications Section.

O. E. Isenberg, general manager of the Harmon Colors Division of B. F. Goodrich Chemical Co., Cleveland, Ohio, has been elected president of the Dry Colors Manufacturers' Association.

Harcourt Amory and **Gustave L. Levy** have been elected to the board of the Witco Chemical Co., Inc., New York, N. Y.

Earle A. Mitchell has retired as vice-president of the Phelps Dodge Copper Products Corp., New York, N. Y. He joined the Habirshaw Wire & Cable Corp. in 1919, prior to its acquisition by Phelps Dodge.

Henry H. Bitler has been named vice-president and general manager of the newly formed Fibres Division of the American Viscose Corp., Philadelphia, Penna., while **Paul E. Hill** has been named director of manufacturing and **George L. Storm** vice-president and sales manager of the division.

John McShain has been elected a member of the board of directors of the Lee Rubber & Tire Corp., Conshohocken, Penna.

J. Boyd Britton, vice-president of Godfrey L. Cabot, Inc., has been appointed to the board of trustees of the Glover Memorial Hospital, Needham, Mass.

Harold W. Burkett, treasurer of the U. S. Rubber Reclaiming Co., Inc., has been elected vice-president of the Buffalo Control of the Controllers Institute of America.

Warren S. McKay has been elected secretary of the United Engineering & Foundry Co., Pittsburgh, Penna., while **Edward G. Frey** has been named assistant treasurer of the firm.

H. Wilfred Lynch has been appointed vice-president in charge of sales and new product development and named to the board of directors of Moxness Products, Inc., Racine, Wisc.

Thomas G. While, manager of the Budget Sales Department of the Goodyear Tire & Rubber Co., and widely known throughout the tire industry as "Mr. Budget," recently received a service pin recognizing his 30 years with the company.

J. W. Gilroy has been assigned to the newly created post of export sales manager for the Jefferson Chemical Co., Inc., with headquarters in New York, N. Y.

Horace L. Baker has been appointed general traffic manager of the Heyden Newport Chemical Corp., New York, N. Y., succeeding **C. J. Meisinger,** who is retiring.

Robert G. Burson has been appointed general sales manager of the Mechanical Goods Division, Dayton Rubber Co., Dayton, Ohio, succeeding **L. C. Strobeck,** who has retired.

John Rusinko, formerly advertising manager of Minneapolis-Moline, has joined Archer-Daniels-Midland Co., Minneapolis, Minn., as manager of the newly formed marketing services department.

W. H. Thorbecke has been appointed manager of the International Division of Continental Carbon Co., New York, N. Y.

William E. Cowell has been named to head up the combined Service and Mileage Sales Departments of the Seiberling Rubber Co., Akron, Ohio.

George I. Rounds, formerly tire cord sales manager, has been named vice-president in charge of marketing for the Industrial Rayon Corp., succeeding **M. P. Epstein** who plans to retire at the year end.

Thomas F. Mika, formerly on a New York assignment for the Chemical Sales Division of Shell Chemical Corp., has returned to the Emeryville Research Center of the Shell Development Co. as assistant department head of the Product Development Department.

Dr. Ray P. Dinsmore, vice-president of research and development for Goodyear Tire & Rubber Co., is on the panel of judges in a contest among industrial scientists called "Jobs for Tomorrow" and sponsored by Microbeads, Inc.

Joseph B. Hall, president of the Kroger Co. of Cincinnati, Ohio, has been elected a director of the Goodyear Tire & Rubber Co., Akron, Ohio, succeeding **B. A. Polsky** who resigned after 11 years on the board.

Gene Greenfield, formerly associated with the Spokane (Wash.) Laboratory of the Kaiser Aluminum & Chemical Co., is now associated with the University of Washington where he is heading up an industrial research project. His experience in the insulated wire industry included many years with the Anaconda Wire & Cable Co.

Leon W. Miller

Appointed Chemical Sales Director

► Plastics and Coal Chemicals Division, Allied Chemical Corp., New York, N. Y., has named Leon W. Miller director of chemical sales. Mr. Miller has been in the Barrett Division, from which the new Plastics and Coal Chemicals Division was recently formed, for more than 42 years. A graduate of Ohio Wesleyan University, he joined Barrett as a building products salesman in 1916 at Cleveland, Ohio. In 1930, he was transferred to New York and became sales manager, Specialties Department, and shortly thereafter manager of chemical sales. Mr. Miller is a resident of South Orange, N. J., and is a member of the Chemists' Club, the Sales Association of the American Chemical Industry, and past president of the Ohio Society of New York. He serves on the Executive Committee of the Drug, Chemical and Allied Trade Section of the New York Board of Trade.

Frank A. Marshall, previously an associate consultant for McKinsey & Co., has been appointed vice-president and general manager of sales for the Endura Corp.

Duane R. Branaka, formerly a Chicago sales representative for Celanese Corp. of America, has been appointed sales manager for the Valvair Corp.

P. D. Austin has been appointed hose sales product manager at the Hewitt Rubber Division plant of Hewitt-Robins, Inc., and will be succeeded as assistant hose product manager by Glenn H. Grundtisch.

Linwood A. Walters, previously manager of research and development for the National Vulcanized Fibre Co., has been appointed director of research and development and a member of the operating board for the company, succeeding Gerald H. Mains, who has retired.

Robert W. Carlson, president of the Minnesota Rubber Co., has been elected to membership in the Twin Cities Chapter of the Young Presidents' Organization.

Introduces New Rubber Compound

► Texas-U. S. Chemical Co., New York, N. Y., has introduced a new type of general purpose, synthetic rubber-carbon black masterbatch that is reinforced with an ultra dispersed carbon black. Designed for use in the tire manufacturing and retread industry, this butadiene-styrene copolymer rubber has undergone severe tire road tests and is now available in commercial quantities.

Carbon black previously required heavy duty, high-power consumption mixing equipment to incorporate it into all rubbers. However, latex blending techniques utilizing chemical dispersing agents were devised during World War II for mixing carbon blacks into general purpose synthetic rubbers. The merits of eliminating dispersing agents, coagulating salts and other foreign materials which detract from masterbach physical properties later became apparent and warranted an intensive investigation of various mechanical mixing methods.

Texas-U. S. undertook an extensive development program last year to perfect methods of non-chemical dispersing carbon black on a plant scale at its Port Neches, Texas, facility. Full-scale production equipment was developed and installed to produce this new type of masterbatch under controlled commercial conditions. Subsequent tire tests using the new product represented attainable commercial results. The company said that the tests proved so successful that millions of pounds of the new black have already been used in commercial tire production.

Elimination of dispersing agents and coagulating salts results in a low ash content that is said to be equivalent to that found in specially processed premium rubbers. Company officials said that the lower power required, shorter mix cycles and cleanliness of these masterbatches, together with the uniformity assured from a fully proved production process, recommends its use in a wide variety of rubber industry compounding.

Syl-off Coated Camelback Rolls

► A new silicone paper coating, developed by the Dow Corning Co., Midland, Mich., has been found to effectively prevent camelback stock from sticking to the cardboard core on which the rubber is rolled. Named "Syl-off", the silicone paper coating was tested for three months and showed no sign of adhesion to the core. Previously, the last few feet of camelback often stuck to the cardboard roll, which then could be separated only by the use of a solvent. Rubber tread suppliers tried unsuccessfully to overcome this problem by coating the cores with various types of waxes and with polyethylene. Polyethylene was better, but core manufacturers found it both expensive and difficult to handle. Applied on the bias, it tended to "dog ear" at the entering corner. Dow Corning officials reported that Syl-off eliminated the costly hand wrapping with polyethylene and that one large tread rubber manufacturing company has standardized on cores topped with Syl-off coated kraft for all the tread stock they distribute.

John H. Drexler, III

Named Special Representative

► John H. Drexler III, former special representative in Germany, has returned to the U. S. as special representative in the Philadelphia District of the Chemical Division of the Goodyear Tire & Rubber Co. Prior to his foreign assignment, Mr. Drexler was a technical representative for the Chemical Division with offices in Cleveland, Ohio, and in New York City. In his new post, he will be concerned with sales of Goodyear Pliolite S-5 and VT resins and Pliolite latices. A graduate of Rutgers University, Mr. Drexler was a Navy pilot in both World War II and the Korean conflict, and was discharged with the rank of Lt. Commander in 1953. He is a member of the American Chemical Society, the Society of Plastics Engineers and the New York Rubber Group.

Pyrometer Company Formed

► A new organization named Pyrometer Co. of America, has been established at Penndel, Penna., to manufacture instruments, thermocouples and accessories. Operating in a new 12,000-square foot steel and masonry structure, the company plans to concentrate initially in the production of a complete line of standard pyrometric accessories of premium quality. John V. Metzger has been named president of the firm and Leonard Bonn has been named vice-president. C. J. Smolinske and Edward R. Stroik have been named sales manager and chief engineer, respectively.

Witco Makes Stock Offering

► Witco Chemical Co., Inc., New York, N. Y., has registered 200,000 shares of common stock with the Securities and Exchange Commission, according to current reports. Public offering of the stock was made about July 30 through a group jointly managed by Smith, Barney & Co., and Goldman, Sachs, & Co. The offering represents the first public sale of the company's stock. Reports stated that the company planned to use 150,000 shares for new financing to provide funds for construction.

U. S. Rubber Names Three

► F. Dudley Chittenden has been appointed to the new post of manager of Marvinol Operations for the Naugatuck Chemical Division of U. S. Rubber Co., Naugatuck, Conn. At the same time, D. L. McCollum replaces Mr. Chittenden as Division production manager and J. Nelson Judy replaces Mr. McCollum as sales-production-coordination manager. Mr. Chittenden will direct sales, production and development of Marvinol vinyl resins for the Division. A native of New Haven, Conn., he joined U. S. Rubber as a chemist in the general research laboratories after obtaining a doctorate in chemistry from Yale University. In 1950 Mr. Chittenden was assigned to the Marvinol resin plant as factory manager and became production manager of the Division in 1955.

Mr. McCollum, sales-production-coordination manager since 1953, is a native of Naugatuck. He joined U. S. Rubber at its footwear plant in Mishawaka, Ind., in 1919 after graduating from Purdue University. In 1951 he became technical assistant to the production manager of the Naugatuck Division and later he was appointed to coordinate sales and production. Mr. Judy is a native of Piedmont, Mo., and holds a doctorate in organic chemistry from Iowa State College. He joined Naugatuck Chemical in 1940 as a chemist in the research and development department. In 1956 Mr. Judy was appointed manager of production engineering and later the same year was named general superintendent of the synthetic rubber plant in Naugatuck.

Seiberling Personnel Changes

► Seiberling Rubber Co., Akron, Ohio, has announced that Sam I. Roudebush has been appointed production coordinator of the Akron facility, while John M. Swarts has succeeded Mr. Roudebush as resident plant manager of Productos de Caucho Villegas, the firm's Colombia, South America, affiliate. Mr. Roudebush, who joined Seiberling in 1953 as assistant manager of tire design, will work on special assignments in production in his new post. He has been plant manager of the South American company since 1954. Mr. Swarts was formerly technical director of the plant which is located in Bogota, Columbia. A University of Akron graduate, Mr. Swarts joined Seiberling in 1950 as a chemist in the development department.

Hummel Offers Barium Chloride

► Barium Chloride technical crystals, used in the manufacture of rubber, paint, paper and leather and chemical processing, is now being offered by the Hummel Chemical Co., Inc., New York, N. Y. The company stated that a typical analysis of Barium Chloride contains 98 to 99 per cent $BaCl_2$ $2H_2O$; 1.0% moisture, 0.001% Iron (Fe); a maximum of 0.2% Calcium (Ca), and a maximum of 0.2% Magnesium (M9). Other applications for this chemical include use in the manufacture of ceramics, dyes, batteries and insecticides. A technical data sheet and further information are available from the company.

Financial News

Thiokol Chemical

► Six months ended June 30: Net income of $865,756, which is equal to 68c a share, compared with $838,493 or 69c a share, in the same period last year. Earnings per share dropped due to an increase in shares of capital stock outstanding. Figures for both six month periods include those of Reaction Motors which was merged with Thiokol as of May 1, 1958, and National Electronics Laboratories Inc., a wholly owned subsidiary. Results of operations of Hunter-Bristol Division, acquired March 10, 1958, have been included for the period subsequent to that date. Net sales for the first six months of 1958 were $3,278,284 as compared to $25,667,737 in the same period last year.

Goodyear Tire

► Six months ended June 30: Consolidated net income of $27,256,807, equal to $2.57 a common share, compared to $35,943,585, or $3.39 a share, in the previous year. Goodyear's net income for the second quarter of 1958 was $16,399,301, against $10,857,506 for the previous quarter, a gain of 51 per cent. Second quarter sales increased 10.2 per cent over the first three months to a six month total of $648,031,308, compared with $721,035,882 recorded in the like period last year.

Seiberling Rubber

► Six months ended June 30: Net income of $48,729 which compares with a profit of $508,402, or 96c a share, in the initial six months of 1957. Second-quarter earnings of 47c per common share reduced a first-quarter loss of 58c, for a net reduction of 11c after preferred dividends for this half. Net sales amounted to $21,411,670, as compared to $23,289,041 in the like period last year.

Columbian Carbon

► Six months to June 30: Net income of $1,482,000, which is equal to 92c a share, compared with $2,673,000, or $1.66 per share, in the same period last year. The 1958 net income excludes special credit of $394,000, or 24c a share, from profit on sale of property. Sales for the six months totaled $31,701,000 compared with $36,385,000 during the same period last year.

Carlisle

► Six months to June 30: Net income of $462,350, or 80c per share, which includes a special credit of $111,565, or 19c a share. Net income for the same period in 1957 amounted to $617,676, which is equal to $1.09 per share. Sales for the first half of this year totaled $6,681,148, compared to $10,819,440 for the corresponding period last year.

Johns-Manville

► Six months to June 30: Net income of $8,011,000, which is equal to $1.12 a share, compared with $8,614,000, or $1.20 a share, during the same period last year. Sales in the first half of 1958 totaled $138,271,000, compared with $148,072,000, in the 1957 half.

National Rubber Machinery

► Six months ended June 30: Net loss of $145,115, compared with a net income of $215,950, which is equal to $1.05 a share, in the corresponding period last year. Sales for the first half of 1958 amounted to $4,029,360, compared with $7,696,774 last year.

Pittsburgh Coke & Chemical

► Six months to June 30; Net income of $443,000, which is equal to 20c a share of outstanding common stock, compared with $1,625,000, or $1.25 a share, last year. Sales for the six months totaled $21,541,000, compared to $27,028,000 for the same period last year.

Minnesota Mining

► Six months to June 30: Net income of $17,786,665, which is equal to $1.05 per common share, compared with $19,832,980, or $1.17 a share, in the same period last year. Net sales in this half were $176,261,592 compared to $181,578,367 in the first half of 1957.

Farrel-Birmingham

► Six months to June 30: Net income of $766,782, which is equal to $2.40 a share, compared with $1,526,284, or $4.77 per share, for the same period in 1957. Sales for the period totaled $19,302,130, which compares with $28,447,068 during the first half of last year.

Mansfield Tire

► Six months to June 30: Net income of $923,129, which is equal to $1.55 per share, compared with $624,252, or $1.00 a share, in the first six months of 1957. Net sales for this period totaled $31,147,571 compared with $30,105,542 last year.

McNeil Machine

► Six months to June 30: Net income of $518,032, which is equal to 77c per common share, compared with $1,804,229, or $3.00 a share, in the corresponding period of the preceding year.

General Cable

► Six months to June 30: Net income of $3,151,352, which is equal to $1.05 per common share, compared with $6,521,270, or $2.25 a share, a year earlier.

Clevite

► Six months ended June 30: Net income of $1,456,319, which is equal to 74c per common share, compared with $2,798,557, or $1.48 a share, for the same period of 1957. Sales in the first half of this year totaled $31,873,743, compared with $39,584,682, during the first six months of 1957.

Flintkote

► Six months ended June 30: Net income of $1,489,303, which is equal to 68c per common share, compared with $2,832,719, or $1.51 a share, in the first six months of 1957. Sales in the first half of 1958 totaled $53,869,895, compared with $56,063,210, during the same period last year.

Amerace

► Six months to June 30: Net income of $1,349,241, which is equal to $2.20 per common share, compared with $815,406, or $1.26 a share, in the same period last year. Sales in the 1958 six month period totaled $22,406,847, compared with $27,330,513, in the first half of 1957.

St. Joseph Lead

► Six months ended June 30: Net income of $2,214,361, which is equal to 81c per common share, compared with $5,759,433, or $2.12, in the same period last year. Sales in the first half of this year totaled $34,340,830, compared with $58,422,166 in the 1957 six month period.

Triangle Conduit

► Six months to June 30: Net income of $1,090,893, which is equal to 80c per common share, compared with $1,704,103, or $1.26 a share, in the same period last year. Sales in the first half of 1958 totaled $26,333,706, compared with $28,084,511, in the 1957 half.

Interchemical

► Six months to June 30: Net income of $1,835,813, which is equal to $2.06, a common share, compared with $1,894,904, or $2.13 a share, in the first six months last year. Sales in the first half of 1958 totaled $53,129,094, compared with $56,270,269, in the 1957 half.

Mohawk Rubber

► Six months to June 30: Net income of $426,000, which is equal to $2.71 per share, compared with $187,000, or $1.19, in the first half of 1957. Sales in the 1958 six month period totaled $10,830,000, compared with $9,485,000, in the equivalent period last year.

Hewitt-Robins

► Six months to June 30: Net income of $440,062, which is equal to $1.05 per common share, compared with $590,220, or $1.44 a share, for the same period last year. Net sales to June 30 totaled $23,871,208, compared with $28,885,320 for the first half of 1957.

Names Three District Managers

► Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio, has named A. R. Merritt to the newly created post of district manager of Hartford, Conn. At the same time, L. P. Thies and L. E. Stanton have been appointed managers in the newly created districts of Detroit, Mich., and Houston, Texas, respectively. With 15 field offices throughout the country, the Chemical Division markets high polymer resins, rubbers and latices to the rubber, plastics, paint, paper and textile industries. Company officials said complete sales and technical service for all products will be available from the new district offices. Mr. Merritt joined Goodyear in 1948 as a member of the training squad and two years later was assigned to production supervision and industrial engineering in Akron. He was transferred to the Chemical Division in 1954 and was special representative in Hartford prior to his present appointment. Mr. Merritt is an engineering graduate from Yale University and is active in the Connecticut Rubber Group and Technical Association of the Pulp and Paper Industry.

Mr. Thies, who previously worked in sales development of synthetic fibers and sales of industrial coatings and vinyl dispersions, joined the firm in 1956. He was assigned to the Cleveland, Ohio, office in 1957 and later transferred to Detroit as special field representative. Mr. Thies is a graduate of Kent State University and holds a master's degree from Indiana University. He is a member of the American Chemical Society, Society of Plastics Engineers, Akron Rubber Group, Detroit Rubber & Plastics Group, and Ontario Rubber Group. Mr. Stanton joined Goodyear in 1954 and had previous experience in the chemical industry as a chemist and technical representative. Prior to his present appointment, he had served as special representative for the Chemical Division in Houston. Mr. Stanton is a graduate of Elmhurst College with a degree in chemistry and is active in the Rubber Division of the American Chemical Society, Southern Rubber Group, and the Dallas Paint and Varnish Protection Club.

Monsanto Appoints Kroeger

► Arthur P. Kroeger, formerly associate director of marketing, has been appointed director of marketing for the Organic Chemicals Division of the Monsanto Chemical Co., St. Louis, Mo. Mr. Kroeger succeeds John L. Hammer, Jr., who is resigning his position with Monsanto to accept appointment as assistant to the president of Mississippi Lime Co. of Alton, Ill. A native of Akron, Ohio, Mr. Kroeger is a graduate of the University of Akron and joined Monsanto at Akron in 1929 as a rubber chemicals sales representative. He served Monsanto in various sales capacities in Japan and the United States leading to his appointment in 1945 as assistant general manager of sales for the Organic Chemicals Division. He became the division's director of sales in 1953 and was appointed associate director of marketing in 1955.

E. B. Brooks

Named Columbian Vice-President

► E. B. Brooks has been elected vice-president in charge of the Carbon Black and Pigment Division for the Columbian Carbon Co., New York, N. Y., succeeding A. Harvitt, who is retiring. Mr. Brooks is a graduate of Dartmouth College and the Amos Tuck School of Business. Previously associated with Binney and Smith Co., he joined Columbian in 1955 as general sales manager. Mr. Brooks is currently a director and president of Columbian Carbon International Inc. He is a member of the Rubber Division of the American Chemical Society.

Firestone Names Lund

► Firestone Tire & Rubber Co. has announced that A. G. Lund has been named as successor to Ross E. Wilson as general manager of the Firestone Plantations Co. in Liberia. Mr. Rose, who was in charge of all Firestone operations in the West African Republic, has recently retired from the organization. The company's principal operation in Liberia is its rubber plantations of 90,000 acres on which about 30,000 Liberians are employed. Joining the Firestone organization at its worldwide headquarters in Akron, Ohio, in 1942, Mr. Lund was assigned to the auditing activities. In 1948, he was assigned to the Foreign Auditing Department, and in 1952, he was assigned the handling of Firestone's Liberian accounting operations. Three years later he was appointed comptroller of the Plantations Co. and took up residence in Liberia. Born in La Salle, Ill., Mr. Lund attended Northwestern University and the University of Pittsburgh.

Mohawk Retread Plant on Stream

► Mohawk Rubber Co., Akron, Ohio, has placed on stream its new Stockton, Calif., plant for the production of tread rubber. The facility replaces the smaller plant at Littleton, Colo., which has been sold, and is expected to have a maximum production of about 25 million pounds annually.

Atlas Powder Elections

► Atlas Powder Co., Wilmington, Del., has announced the election of Ralph K. Gottshall as chairman of the board and his re-election as president. As board chairman, Mr. Gottshall succeeds Isaac Fogg, who has retired after nearly 46 years of service. Mr. Fogg will remain as a director, member of the finance committee and chairman of the committee on audit.

The board has also elected Edward J. Goett, senior vice-president, to the position of executive vice-president; Edward J. Massaglia, general manager for operations of the Chemicals Division, to vice-president and general manager of the newly consolidated Chemicals Division, and Robert J. Reilly, assistant treasurer, to treasurer and secretary. Mr. Reilly succeeds Preston W. Parvis, who has also retired after more than 47 years of service. Mr. Parvis remains a member of the board and was appointed a member of the committee on audit. John H. Leary, assistant to the president, has been elected assistant treasurer and assistant secretary, while Norman E. Miller, company comptroller, has been elected an officer. Officers re-elected were vice-presidents James R. Frorer, Charles C. Gammons and William C. Lytle. Arnold J. Fiedler has been named assistant secretary-treasurer.

Southeastern to Double Plant

► Southeastern Rubber Manufacturing Co., Athens, Ga., has announced that a new addition which will more than double plant size will be made to the company's present building in the first part of a half million dollar expansion program initiated to double production. In the projected construction, office and floor space on the first floor will be doubled and a full basement will be built. Completion of the new unit is scheduled for September, however, production will not begin before next year when new equipment has been installed. This equipment will allow the production of "off-the-road" tread rubber for bulldozers and large construction equipment. The expansion is necessary, the company stated, because of the increased volume of business. Now running 24 hours a day, six days a week and three out of four Sundays, the facility produces a million and a half pounds of tread rubber monthly and is expected to manufacture a little more than twice that amount next year.

Pioneer Celebrates 40th Year

► Pioneer Rubber Co., Willard, Ohio, is celebrating its 40th anniversary this year with the slogan "Forty Years of Fun in Business." Founded in an abandoned windmill factory on the outskirts of Willard, Pioneer has grown to include plants in California and Texas as well as its main buildings in Willard and Attica, Ohio. Its market extends throughout the United States and includes the Western European countries. Pioneer produces all types of household gloves, rubber and neoprene gloves for surgeons and industrial workers, and Qualatex balloons ranging from conventional round balloons on sticks to specialized balloon toy games.

FMC Appointments Announced

► Chemical Divisions of Food Machinery and Chemical Corp., New York, N. Y., have named Dr. Hans O. Kauffmann director of research and development for the Inorganic Chemicals Department and Dr. Oscar H. Johnson director of research and development for the Organic Chemicals Department. Dr. Kauffmann has been associated with FMC's Becco Division since 1928, most recently as technical director, supervising research, development and technical service. Educated in Germany, Dr. Kauffmann received his doctorate from the University of Tuebingen. He is a member of many technical societies. Dr. Johnson, formerly director of research for the Niagara Chemical Division, became associated with FMC in 1946 and has specialized in organic chemical research with both the Niagara and Westvaco Divisions. He received his doctorate from the University of Nebraska and is a member of the American Chemical Society and the Entomological Society of America.

U. S. Rubber Shows New Treads

► Three new lines of tire tread rubber have been introduced for the fast growing retread industry by U.S. Rubber Co., New York, N. Y. The new treads are named "U.S. Royal Tread", "U.S. DeLuxe Tread", and "Blue Seal Tread." According to the company, the U.S. Royal line is made for every operating condition encountered by passenger cars, buses, off-the-road trucks and off-the-road heavy duty vehicles, as well as for airplanes and industrial vehicles. U.S. DeLuxe Tread is made for passenger car and truck tires, and Blue Seal for passenger car tires only. Types of tread rubber in the U.S. Royal line are: 100 per cent cold rubber —for passenger car and heavy service tires; natural rubber cut resisting—for off-the-road and highway heavy service tires; truck and bus extra heavy duty—for truck and bus tires in severe, high-speed operations; Wintrac—for passenger snow tires; Industro-Cap—for all types of industrial tires, and airplane—for commercial and Air Force regular and jet aircraft tires.

Transfers Rubber Research

► American Cyanamid Co., New York, N. Y., has relocated its rubber chemicals research group at the company's Research Center in Bound Brook, N. J., in order to effect closer liaison between research, production and sales and to provide increased service benefits to the rubber industry. Formerly located at Cyanamid's research laboratories in Stamford, Conn., the rubber chemicals research section occupies a total area of over 5,000 square feet on the first two floors of the new air-conditioned building, which was dedicated in October, 1957. Arnold R. Davis, who has directed Cyanamid's rubber chemicals applications studies for 21 years, will manage this section of the laboratory. Synthesis of new chemicals for the rubber industry will be the responsibility of Dr. F. A. V. Sullivan and his group of chemists, while Dr. J. H. Thelin will be the group leader for rubber chemicals evaluation and application studies. The rubber chemicals research section will endeavor to discover and develop other functional chemicals that will be required to meet the needs of both natural and synthetic rubber producers. Attention will also be given to extending the range and application of Cyanamid's present line of rubber accelerators, peptizers, retarders and antioxidants.

Goodrich Developes New De-icers

► B. F. Goodrich Aviation Products, Akron, Ohio, has developed what is said to be a simple system of pneumatic de-icing for light twin engine airplanes. The new system is entirely mechanical, adds only 50 pounds to the weight of the plane and is economically installed, Goodrich states. The semi-automatic system is controlled entirely by the pilot. By pushing a valve, he actuates the de-icers, which consist of small simultaneously inflating, spanwise tubes on leading edges of the wings and tail. "Stored energy" in the form of compressed air or other inert gases is released, thus breaking ice formations. The valve closes automatically at the end of the cycle, deflating the de-icers.

The compressed gas is stored in a one-half cubic foot fiberglass sphere with a working pressure of 3,000 psi. On an average twin engine business plane, this sphere would provide approximately six hours of de-icing if the de-icers were activated once every three minutes. The sphere is similar to those used in the pneumatic system of the first stage rocket that helped launch the Army's "Explorer" satellite, a company spokesman states. The stored energy system is said to eliminate the pump and associated oil filtering and separating equipment, timers, solenoid valves and miscellaneous plumbing, which are used in the present method of de-icing. As a result, installation and maintenance are reduced and simplified. Major components of the system, weighing 22 pounds, are easily removed when maximum weight saving is desired for summer flying. The prototype system has been issued a supplemental type certificate by the Civil Aeronautics Administration for a Piper PA-23 "Apache" owned by the Westport Development and Manufacturing Co., Inc., Milford, Conn.

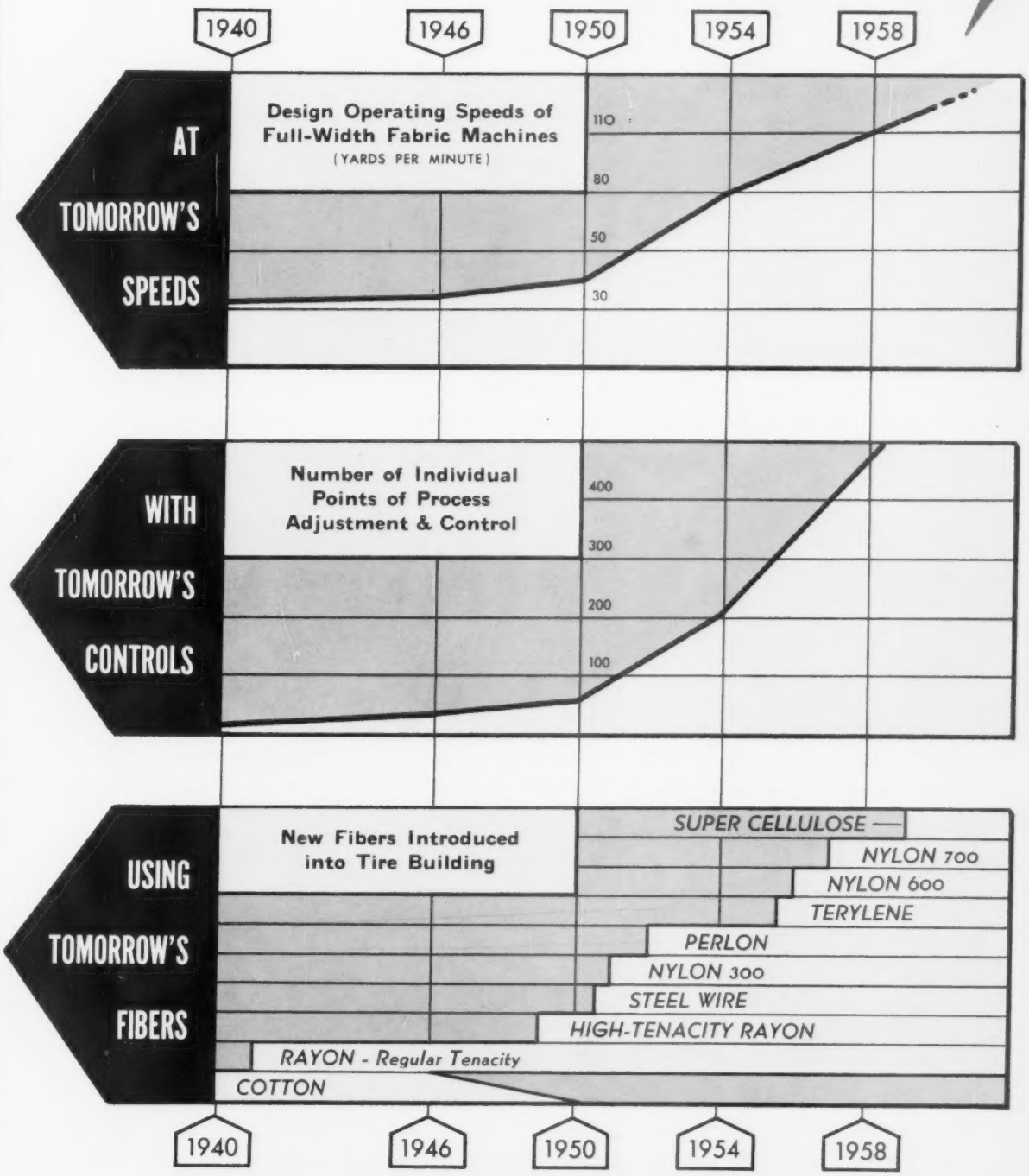
Forms Molded Products Division

► Expanded sales and increased market potential for highly engineered molded rubber products have resulted in the formation of a Molded Products Sales Division of the Dayton Rubber Co., Dayton, Ohio, company officials report. The fabrication plant for the Division is located at Three Rivers, Mich. The new division will market a wide range of natural and synthetic rubber industrial machine parts ranging from small bushings to gigantic rollers for steel mills. The company said that plans are being made for the development of new elastomers for special usage as well as continued industrial applications for precision parts, and research and development in the vibration control field. In line with Dayton Rubber's product development program, the new division has available a fully equipped machine shop to produce extrusion dies as well as molds for product samples designed and machined to customer specifications.

Harter Named Vice-President

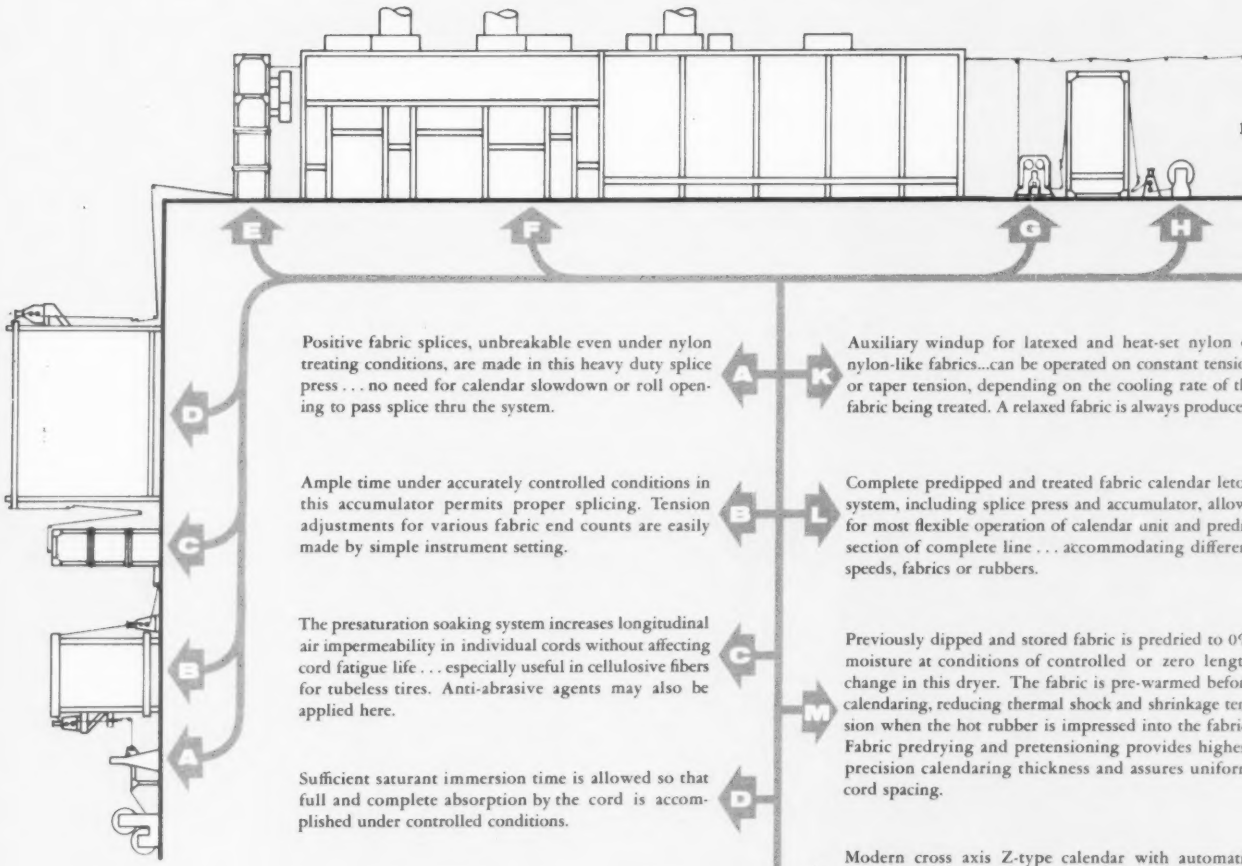
► E. K. Harter has been elected vice-president, personnel, for the Garlock Packing Co., Palmyra, N. Y. Mr. Harter joined the company in 1943 and has served successively as a personnel manager, director of industrial relations and director of personnel. Before joining Garlock, he was superintendent of training at Curtiss-Wright in Buffalo, N. Y., and he has also served with the New York State Department of Labor. Mr. Harter, who attended Columbia University, is a member of the American Management Association and of the Finger Lakes Personnel Manager Association.

ADVANCED TIRE CORD PROCESSING



C. A. LITZLER CO., INC. CLEVELAND 9, OHIO

SOUND ENGINEERING



A Positive fabric splices, unbreakable even under nylon treating conditions, are made in this heavy duty splice press . . . no need for calendar slowdown or roll opening to pass splice thru the system.

B Ample time under accurately controlled conditions in this accumulator permits proper splicing. Tension adjustments for various fabric end counts are easily made by simple instrument setting.

C The presaturation soaking system increases longitudinal air impermeability in individual cords without affecting cord fatigue life . . . especially useful in cellulosive fibers for tubeless tires. Anti-abrasive agents may also be applied here.

D Sufficient saturant immersion time is allowed so that full and complete absorption by the cord is accomplished under controlled conditions.

E The latex dipping systems handle all types of natural synthetic or Pyridine type dips. Excess solution is properly removed from the fabric in fluid state, assuring a very clean web and minimum dryer downtime for cleaning and housekeeping.

F Convection drum or festoon type tension dryers for rayon, or predryers for nylon, remove dipping moisture from the fabric at proper drying rates and precise stretch or tension levels, with minimum cord displacement . . . pick cord alignment is unchanged, and high cord tensile strength assured.

G Water-cooled or steam-heated capstan rolls propel the fabric smoothly, without damage to warp or weft. Low pressure T_i inlet rolls hold fabric lightly and prevent self-abrasion of cords.

H Constant tension windup for auxiliary batch-off of tension dried rayon fabric gives broad flexibility in the train operation. Unit can be operated separately either as a predip unit or as a complete calendar train.

I Synchronously driven steam-heated rolls hold back nylon fabric without distortion under maximum hot stretching tensions. Heavy-wall roll design insures minimum deflection. No dancer roll inertia is present to distort fabric while in the plastic state.

J Single, dual or triple hot stretch zones for nylon and nylon-like fabrics heat web by high impact velocity, constant time, two side heating along entire length. Exposure time, temperature and impact velocity are variable or fixed as required. Fabric is processed at constant stretch and in a fixed fabric path. Heating and cooling air are instantly available...no waiting for heavy rolls and tension elements to alter their position. Cooling on shutdown — and reheating after shutdown — is instantaneous.

K Auxiliary windup for latexed and heat-set nylon nylon-like fabrics...can be operated on constant tensi or taper tension, depending on the cooling rate of t fabric being treated. A relaxed fabric is always produce

L Complete predipped and treated fabric calendar lete system, including splice press and accumulator, allov for most flexible operation of calendar unit and predi section of complete line . . . accommodating differe speeds, fabrics or rubbers.

M Previously dipped and stored fabric is predried to 0% moisture at conditions of controlled or zero lengt change in this dryer. The fabric is pre-warmed befo calendaring, reducing thermal shock and shrinkage ter sion when the hot rubber is impressed into the fabri Fabric predrying and pretensioning provides highe precision calendaring thickness and assures uniform cord spacing.

N Modern cross axis Z-type calendar with automat duplex screw-down control provides maximum calen dar speed and accuracy of rubber/fiber sandwich thick ness. Balanced or unbalanced fabric cross section ca be easily and accurately produced.

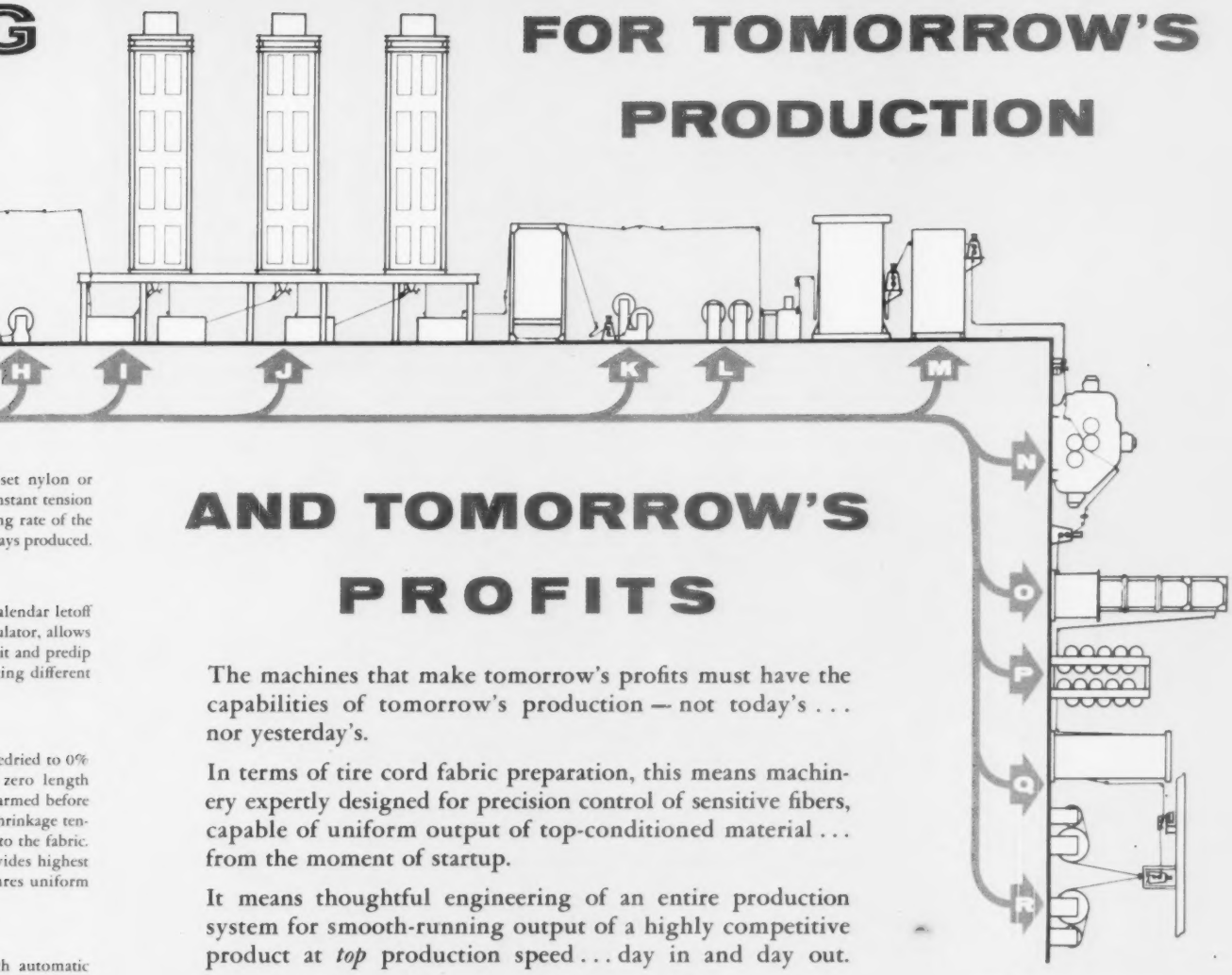
O Uniform fabric tackiness reduces liner adhesion an increases speed of tire building . . . reduces scrap los and down time at building machines and bias cutter . . . allows use of higher percentages of less expensiv synthetic compound at the calendar.

P Positive rubberized fabric cooling assured by adequat cooling drum capacity. Constant rate cooling unde tension control assures uniform shrinkage and stabilize internal cord tension at fabric windup.

Q Expand/Aligner system at windup — as elsewhere i the system — assures uniform fabric and liner roll edg condition. Centering effect is accurate, and E/A doe not stretch or split the fabric. Operates under low o high windup tensions.

R Controlled tension windup allows for handling 54" diameter liner-and-fabric package. Liners can be vacuum cleaned and brushed in position if desired.

FOR TOMORROW'S PRODUCTION



AND TOMORROW'S PROFITS

The machines that make tomorrow's profits must have the capabilities of tomorrow's production — not today's . . . nor yesterday's.

In terms of tire cord fabric preparation, this means machinery expertly designed for precision control of sensitive fibers, capable of uniform output of top-conditioned material . . . from the moment of startup.

It means thoughtful engineering of an entire production system for smooth-running output of a highly competitive product at *top* production speed . . . day in and day out.

It means design by an informed group of forward-thinking engineers, so that the entire production system has built-in versatility to handle future advances, with a minimum of adaptation.

The complete 300-foot multi-zone rayon/nylon line sketched on these pages is an example of one of today's installations for tomorrow's profits. Some eighty such systems — large, medium and small, installed and abuilding across the world— attest to the efficiency of Litzler design for the high speed production of very precisely conditioned material.

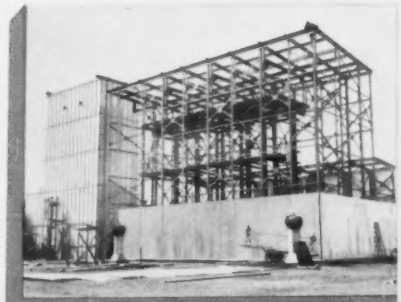
1949 — FIRST 8,000 # TENSION UNIT

1951 — FIRST 12,000 # TENSION UNIT

1952 — FIRST NYLON CALENDAR TRAIN

1954 — FIRST 20,000 # TENSION UNIT

1957—FIRST TRIPLE ZONE NYLON TREATMENT



Resourceful engineering makes way for tomorrow's equipment in today's plant. Here treatment towers push their way through the roof in the world's first triple-zone installation, currently being completed.

C. A. LITZLER CO., INC.

ENGINEERS & BUILDERS OF PACE SETTING SYSTEMS

1817 BROOKPARK RD. **CLEVELAND 9, OHIO** CABLE "CALITZ"

EXPORT REPRESENTATIVE: GILLESPIE & CO. OF N. Y., 96 WALL ST., NEW YORK 5, N. Y.

LICENSED EUROPEAN FABRICATORS IN ENGLAND, GERMANY AND FRANCE

MEMO TO MEN
ON THE WAY UP

WHERE THERE'S BUSINESS ACTION THERE'S A BUSINESSPAPER

Used to be a song, back in the Thirties, titled, *Little Man, You've Had a Busy Day*. Didn't mention the Big Man. But his days are busy, too. He's the man who must make top-level decisions in business. And to make those decisions, he must have facts. All the facts. All the pertinent information he can get.

He finds time, in his busy days, to get that information. How? By getting a major portion of it from one unique source: the business publications serving his particular field.

No businessman, Little or Big, is fully informed until he reads his businesspaper. He reads it for profit, not for pleasure. He searches it through for news of the trade or industry. For facts. For fresh ideas. For new products he can put to work. And he reads the advertising with the same intense concentration he devotes to the editorial pages.

For the man on his way toward becoming a Big Man, his businesspaper is especially important. Take a tip from the reading habits of key men at every level. Take out a subscription of your own. Then, make the time to read every issue—and read it thoroughly.

RUBBER AGE ABP

101 West 31st Street, New York 1, New York

Opposes ISO Recommendation 52

► ISO Recommendation 52 of the International Organization for Standardization, a recently published international standard covering grooved pulleys for V-belts, has been opposed by the American Standards Association on grounds that it would exclude American industrial V-belts supplied with pulleys made to the new international standard. The standard describes the principal characteristics of grooved pulleys intended to take endless V-belts for industrial power transmission drives for horizontal parallel shaft operation.

The recommendation was developed by technical committee 41 of ISO, in which group, United States industry did not participate until after the drafts of the recommendation had been compiled. American Standards Association Section Committee B55 on V-belts and V-belt Drives, which represented United States interests on the ISO work, reviewed Recommendation 52 and suggested modifications. The committee stated that even though many of the deviations would not affect practical interchangeability between American products and those made to the international standard, all pulleys made to American standards could be rejected on one or more counts if inspected under this recommendation.

Members of the committee believe that differences in the various national standards could have been ironed out in an international standard and still retain the great extent of interchangeability that now exists among the products of various countries. They feel that drastic design changes will be necessary in all countries if ISO Recommendation 52 is to be followed. Copies of *ISO Recommendation 52, Grooved Pulley for V-belts (Sections A, B, C, D, E)* are available at 80c each from American Standards Association, 70 E. 45th St., Dept. PR6, New York 17, N. Y.

ASTM Publishes "Proceedings"

► The American Society for Testing Materials has published the 1957 ASTM *Proceedings*, Volume 57. The 1430-page volume records the technical accomplishments of the year, and includes reports and papers together with discussion offered to the Society and accepted for the *Proceedings*. The volume includes the Summary of Proceedings of the ASTM 60th Annual Meeting and the Summary of Proceedings of the Philadelphia Spring Meeting. Programs for each session are listed by title and author. The president's annual address, by R. A. Schatzel, "Our Expanding Technology and ASTM", notes the society's responsibilities in areas for contributions to the national technical welfare. Also included is the annual report of the board of directors which discusses administrative, technical and financial matter; records of all meetings held by the Society and its districts; information on membership gains; publications; honors and awards, and other pertinent material. Copies of the *Proceedings* may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna., at $12.00.

Charles J. Wiley

Named Market Development Manager

► Charles J. Wiley, who joined the company in 1957, has been appointed market development manager of the Callery Chemical Co., Pittsburgh, Penna. Mr. Wiley, a chemist, will be responsible for market development activities for the new chemical products under development by the firm. He is a graduate of Girard College and the University of Pennsylvania, and received his M. S. degree from the University of Massachusetts in 1949. Mr. Wiley was formerly employed by Foote Mineral Co., Sharp & Dohme Division of Merck & Co., and the National Aluminate Corp. An Army veteran of World War II, Mr. Wiley is a member of the American Chemical Society, Sigma Xi, and the Pittsburgh Chemical Marketing Club.

Seiberling Names Drury

► Seiberling Rubber Co., Akron, Ohio, has appointed James P. Drury manager of production analysis and control in charge of factory scheduling operations, and receiving and production analysis. Mr. Drury was formerly superintendent of automobile floor mat production and before that he was production control manager of the tire division. A twelve year veteran of Seiberling, he has also served as general foreman of the curing division, manager of factory scheduling and factory scheduler. Mr. Drury, a native of Louisville, Ky., graduated from Ohio University in 1938 with a Bachelor of Science degree.

Akron University Awarded Contract

► The Institute of Rubber Research at the University of Akron, Akron, Ohio, has ben awarded an Army Signal Corps contract for $78,500 to permit the continuation of studies to determine what causes the deterioration of rubber. Dr. Maurice Morton, professor of polymer chemistry and director of the Institute is in charge of the project, which has been underway for the past few years. The contract, the largest ever received by the Institute, was awarded by the U. S. Army Signal Supply Agency Laboratory, Procurement Support Office at Fort Monmouth, N. J.

Introduces D.C.L. Truck Tire

► General Tire & Rubber Co., Akron, Ohio, has introduced a new-design truck tire that is said to deliver greater original and retread mileage than any tire on the road today. Named the "D.C.L." (Deep Cross Lug), the new highway tire, with its "Nygen" carcass and wide flat contour, has been proved over millions of miles of torture and durability tests. A unique feature of the D.C.L. is the tread, which has a 29/32-inch non skid depth halfway between the center and the shoulder. A cross-lug design, the tread has a circumferential, running center rib with jagged, "outrigger" bars jutting out to the sidewalls at regular intervals for stability and traction. The tread bars are alternately wide and narrow for substantial noise reduction. Company officials said such a deep tread could be used effectively only in combination with its specially processed cord which resists heat damage, bruise breaks and blowouts. They reported that the multiplicity of angles and corners greatly increases traction and provides extra resistance to dangerous side slippage.

Introduces Dnoda Plasticizer

► Monsanto Chemical Co. of St. Louis, Mo., has announced an addition to its line of more than 70 plasticizers, with the commercial availability of "Dnoda" (di n-octyl, n-decyl adipate). A primary plasticizer for polyvinyl chloride, Dnoda imparts excellent low temperature flexibility and efficiency along with softness, superior "hand" and "drape", permanence, water resistance and heat and light stability, the company states. The superior low temperature properties of the compound are said to be ideally suited for use in better quality film, sheeting and coated fabrics as well as jacketing for electrical insulation. It imparts low initial viscosity and excellent shelf life to vinyl dispersions and plastisols. Primarily a plasticizer for polyvinyl chloride and chloride acetate copolymers, Dnoda also is compatible and useful with nitrocellulose, ethyl cellulose, chlorinated butadiene-styrene and nitrile rubbers. It is effective with polyvinyl butyral, cellulose acetate butyrate, polystyrene, methacrylate and dammar.

SAMA Tubing Standard Issued

► Scientific Apparatus Makers Association, Chicago, Ill., has issued the "SAMA Rubber and Plastic Tubing Standard" which lists some 81 different sizes and tubing wall thicknesses most commonly used in the country's laboratories. Rubber and plastic tubing users are urged to acquaint themselves with the recommended SAMA standard as a means of simplifying ordering procedures and providing better service on such items. SAMA states that its standard does not preclude the manufacture or sale of products that do not conform to the standard. Copies of the "SAMA Rubber and Plastic Tubing Standard" may be obtained without charge by writing to Tubing Standard, Scientific Apparatus Makers Association, 20 N. Wacker Drive, Chicago 6, Ill.

News in Brief

► Technical Bulletins describing "Plasite" high resistant protective coatings developed by the Wisconsin Protective Coating Co., Green Bay, Wisc., are available from the company. Write for technical bulletin file and the new general information bulletin No. 258.

► A convenient means of selecting the proper valve for tubeless tire applications on all models of cars has been provided in a new wall chart published by the Dill Manufacturing Co., 700 E. 82nd St., Cleveland 3, Ohio.

► Sturtevant Mill Co., Harrison Square, Boston 22, Mass., has released a new technical bulletin, Bulletin 091, on the Micronizer, which describes fluid energy grinding and gives typical grinding data.

► Rubba, Inc., 1015 E. 173rd St., New York, N. Y., has announced the development of two adhesives, "Rubgrip" and "Rubtex", for bonding mylar to wood, leather fabric, paper and other porous materials.

► G. M. Basford Co. has been appointed public relations counsel in this country for Montecatini Societa Generale, Milan, Italy.

► Tan belts made of Koroseal which were incorporated two years ago by the Charms Co. to convey Charms lollipops, are said to prevent the hot lollipops from sticking, and to be easier to keep clean and sanitary.

► New orange-colored, heavy duty tarpaulins made of Krene vinyl film laminated to both sides of a nylon fabric interlayer, are used by Consolidated Edison Co. of New York, Inc., to provide workmen with protection from rain and snow.

► A tough "skin" of vinyl plastic on ice cream freezer lids in dairy stores and restaurants, consisting of a ⅛ inch thick coating of a plastisol based on Geon vinyl resins, is said to have reduced the expensive and frequent replacement of the lids.

► Chicago Rubber Co., Inc., has moved to 651 Market St., Waukegan, Ill. The new telephone number is Delta 6-8900.

► Marbon Chemical Division of the Borg-Warner Corp., 7165 Chicago Ave., Gary, Ind., has issued a specially designed file folder which contains helpful information about "Cycolac" high impact thermoplastic resin.

► Sprout, Waldron & Co., Inc., 130 Logan St., Muncy, Penna., has announced the availability of Bulletin 194, which describes in detail the company's Style "K" Laboratory Mixer.

► "DFD-4030," a new polyethylene material specifically compounded for sheet extrusion and vacuum forming, is described in Vol. 3, No. 1 of *Extruderitems*, publication of the Bakelite Co., New York, N. Y.

► Minnesota Rubber & Gasket Co., Minneapolis, Minn., has developed a method for producing "Quad-Ring" seals of standard cross-sections in diameters of any magnitude.

► A technical bulletin on "Maraset Resin No. 341", a lead-filled epoxy casting material, has been issued by the research laboratories of the Marblette Corp., 37-31 30th St., Long Island City 1, N. Y.

► Magic Chemical Co., Brockton, Mass., has announced the publication of a new edition of its catalog "Adhesives, Sealants, Paints and Coatings Listed According to Government Specifications".

► A 12 page booklet entitled "Powdered Activated Nuchar for Purification and Reclamation" has been published by Industrial Chemical Sales Division of the West Virginia Pulp and Paper Co., 230 Park Ave., New York 17, N. Y.

► Furane Plastics, Inc., 4516 Brazil St., Los Angeles 39, Calif., has released a new bulletin on "Epibond Adhesives", bonding agents for metals, plastics, rubber and ceramics.

► Marbon Chemical Division of the Borg-Warner Corp., 7165 Chicago Ave., Gary, Ind., has announced the publication of a series of special technical bulletins entitled "Cycolac Product News".

► A new 12 page booklet entitled "X-ray Analysis Theory & Instrumentation" is available from the Instruments Division of Philips Electronics, Inc., 750 South Fulton Ave., Mount Vernon, N. Y.

► Emery Industries, Inc., has moved its Philadelphia sales office to 4343 East River Drive. The office was previously located at 401 N. Broad St.

► Jordan Industrial Sales Division of OPW Corp., 6013 Wiehe Road, Cincinnati, Ohio, has released Bulletin F-43, which describes the company's line of hose swivels. The four page bulletin includes cut-section illustrations, product specifications, application information and other descriptive data.

► Polymer Chemicals Division of W. R. Grace & Co., Clifton, N. J., has developed a new dry-coloring process for injection molding of thermoplastic resins, which is said to make possible savings of at least 65 per cent or more over color compounding.

► Preformed neoprene seals for curtain wall construction will prevent leakage and excessive air infiltration even under maximum stress conditions, according to R. H. Barton (DuPont), who spoke at a recent meeting of the Aluminum Window Manufacturers Association.

► A color slide presentation, called "The Care and Feeding of Cash Registers", and designed to enlist the support of local elements in the electrical industry for its new commercial/institutional wiring program is now available from the National Wiring Bureau, 155 E. 44th St., New York 17, N. Y.

► Lithium Corp. of America has begun commercial production of lithium perchlorate, which was previously produced only in research quantities.

► National Bureau of Standards Circular 590, entitled "Methods of Testing Thermocouples and Thermocouple Materials", by William R. Roeser and S. T. Lonberger, may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. The 21 page circular is priced at 20 cents.

► Dow Chemical Co. has announced that volume production of allyl alcohol, said to be a highly reactive material, has begun at the company's Texas Division.

► A four page bulletin issued by Furane Plastics, Inc., 4516 Brazil St., Los Angeles 39, Calif., describes the use of epoxy resins in various industries.

► Product Data Sheet 5705, released by the Richardson Scale Co., Clifton, N. J., describes the new PCR Control (Punched Card Reader) for automatic control of blending, batching and proportioning operations.

► A four cent per pound reduction on the base price of "Hi-fax", has been announced by the Hercules Powder Co. The new base price is 43 cents per pound.

► Publication of a bi-monthly magazine dealing with equipment and systems for mixing and blending, size reduction, bulk materials, handling, pelleting and densifying, and size classification, has been announced by Sprout, Waldron & Co., Inc., 130 Logan St., Muncy, Penna.

► Borden Chemical Co., 350 Madison Ave., New York 17, N. Y., has released a new 18 page bulletin on its "Polyco 806", a vinyl acetate copolymer emulsion developed by the company's Polyco- Monomer Department.

► Applications and physical property data on all plastics produced by the Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn., have been condensed in a new eight page booklet.

► Fourteen different types of reactions involving styrene oxide have been described in a new 16 page booklet available from Technical Service and Development, Dow Chemical Co., Midland, Mich.

New Monastral Red Pigments

► Development of a new family of red pigments, with properties which make possible for the first time durable red shades for automobile finishes, fabrics, plastics, inks and other products, has been announced by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Named "Monastral," a new unit has been constructed at the Newport, Del. plant for the manufacture of the new red pigments. Preliminary production of the new pigments is now under way and commercial quantities will be available this Fall, according to company officials. The result of 13 years of research and development, the Monastral reds and violets have properties similar to Monastral blues and greens developed by DuPont. Because of the intensity of Monastral reds, strong colors can be produced, even when let down with white or used in metallic or polychromatic finishes.

One of the first major uses of the pigment is expected to be in the automobile finishes field, in metallized finishes, tints and as toning colors. Because of the lightfastness of the new pigment in fabrics, Monastral reds are expected to solve many fading problems. Vinyl, polyethylene and other plastics in such products as garden hose, toys and beachware now can be compounded in red or violet tints that retain their original color despite sunlight and heat. Since Monastral red pigments do not bleed in the presence of soap, alkali and many solvents, and resist migration, the new pigments are expected to find extensive use in squeeze bottles, refrigerator ware and many other plastic products.

Carbide To Build New Laboratory

► Union Carbide Chemicals Co., New York, N. Y., has decided to proceed with the construction of a new Technical Service Laboratory at Eastview, near Tarrytown, N. Y., which is expected to broaden the scope of customer service and application research. The company had previously deferred plans to develop this site pending further study. Construction is scheduled to be completed by late 1959 or early 1960.

The laboratory, a three-story building located on a 280-acre tract, will have a main building with a total of 85,000-square feet and housing 53 individual laboratory units. A mechanical test building will be included in which to conduct pilot plant operations and special materials testing studies. Glass will be used extensively on exterior walls to provide a maximum of natural light and to give the buildings an attractive, contemporary appearance. The laboratory will also include a 200 seat auditorium for seminars and other technical meetings and it is anticipated that the technical service headquarters will serve as a training center for Carbide technical sales representatives. The new unit will both expand and centralize the company's facilities for the development of technical information and for application research on new products.

James M. Jones

Joins St. Joseph Lead

► St. Joseph Lead Co., New York, N. Y., has announced that James M. Jones has joined the company's New York office as a zinc oxide sales representative, covering metropolitan New York, southern Connecticut and eastern New York State. Mr. Jones received a B.S. in chemical engineering from Penn State University in 1951 and after graduation he joined the Goodyear Tire and Rubber Co. His experience with that firm included six months' service in the Goodyear Production Squadron, where he did plant work. During that time, he also studied rubber technology at the Goodyear Industrial University. Early in 1952, he joined the Goodyear Chemical Division as a sales trainee in the Development Laboratories of the Rubber, Plastics and Paint Departments and since October, 1953, he has been a sales representative for Goodyear Chemical Division in the rubber, plastics, textile and paper industries. Mr. Jones attended the Basic Rubber Technology course sponsored by the Philadelphia Rubber Group at Villanova University and also graduated from Gibson Institute of Philadelphia, where he studied the basic Dale Carnegie courses. He is a member and director of the Philadelphia Rubber Group and a member of the Philadelphia Chapter of the Society of Plastics Engineers.

Velsicol Opens New Office

► Harold Freedman has been named to take charge of the newly established offices of the Industrial Chemicals Division of Velsicol Chemical Corp. at 780 Beacon St., Boston, Mass. Mr. Freedman was formerly New England area representative for the firm. In addition to servicing accounts for hydrocarbon resins, solvents and other chemical products, Mr. Freedman will provide technical service to the company's customers in the paint, rubber, and floor tile industries. Company officials hail the establishment of the New England office as another step to improve customer service and to provide a closer link between its customers and the Velsicol research laboratories.

Chemigum Latex 248 Introduced

► A medium nitrile content butadiene-acrylonitrile latex developed to meet the need for a high solids product possessing good color stability has been introduced by the Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio. A general purpose latex, "Chemigum Latex 248" contains a synthetic surfactant-type emulsification system which promotes stability during compounding and processing. In addition, Chemigum Latex 248 exhibits exceptional resistance to light aging and heat deterioration, the company states. The new latex often can be used directly as shipped or with the addition of small amounts of thickener. Unlike many rubber polymers, the Chemigum family of latices can be used in uncured form because of the chemical nature of the polymer and the highly efficient antioxidant system added during latex production. The excellent adhesion and fiber binding characteristics of Chemigum Latex 248 suggest its use in textile inks, nonwoven fabrics, textile backcoatings and sizing, leather finishes, pigmented paper coatings, carpet backings and as a base for nitrile-type latex adhesives. It is now commercially available in drum or bulk quantities.

Borden Resinite EP-145

► Borden Chemical Co., New York, N. Y., has developed what is said to be a new, tougher and lighter extruded tubing for jacketing coaxial, umbilical and other cables which has been designated "Resinite EP-145". The new polyvinyl chloride material, described as "an improved equivalent of Specification MIL-R-6855, Class II, Grade 60 synthetic rubber" has from 11 to 31 times the abrasion resistance of neoprene at various test cycles and is considerably lighter, the firm states. Its lower specific gravity, higher tensile strength and greater abrasion resistance permit thinner walls and the use of less material. According to Borden, exposure increases the tensile strength of Resinite EP-145 which is also said to remain flexible at temperatures below —100°F., to be flame resistant and self-extinguishing, and to surpass requirements for hot-air aging, hot oil and hot water immersions. Available in red and black, from ¼ to 1½ inch inside diameters, Resinite EP-145 is manufactured by the Resinite Department of the Borden Chemical Co. at plants in North Andover, Mass. and Santa Barbara, Calif.

Aldan Rubber Names Oldenbrook

► Gerrit Oldenbrook, formerly general manager of the coating plant of H. M. Sawyer Co., has been appointed head of vinyl coating operations for the new Plastic Division of the Aldan Rubber Co., Philadelphia, Penna. The new vinyl coating operations of Aldan Rubber are housed in a 17,000-square foot addition that was made to the plant last year. Mr. Oldenbrook is a member of the American Chemical Society.

OTS Reports Research Results

► Army evaluation has confirmed that synthetic cis-polyisoprene rubber, developed by private industry, has essentially the same physical and chemical properties as natural rubber. A report issued by the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., fully describes results of tests made by the U. S. Army. Entitled *Evaluation of Coral Rubber (cis-polyisoprene)* by J. C. Montermoso, A. Wilson and C. B. Griffis, Quartermaster Research and Development Command, U. S. Army, the report confirms the claim that cis-polyisoprene has been synthesized by several major rubber companies with resulting properties which are identical to natural rubber. Order PB 131232, a 15 page report, was published in April, 1957 as is priced at 50c.

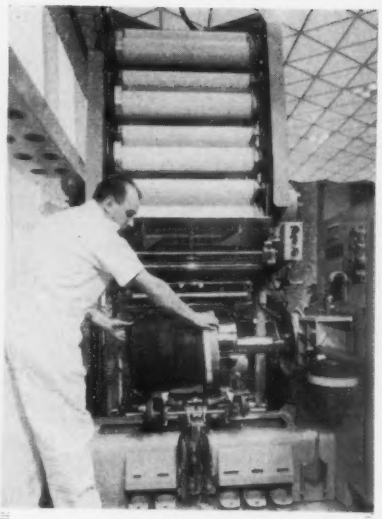
Another report, called *A Study of the Effects of Nuclear Radiations on Elastomeric Compounds and Compounding Materials: Part 1*, has been compiled by D. L. Loughborough, A. E. Juve, J. R. Beatty and J. W. Born, B. F. Goodrich Co., for Wright Air Development Center, U. S. Air Force. This report, PB 121811, deals with the discovery of a group of chemicals, normally used as antioxidants, which inhibit radiation effects in natural rubber, pure gum and black compounds. Published in August 1956, the volume consists of 107 pages and sells for $2.75. *Part 2* of this report, PB 121705, was prepared by J. W. Born, B. F. Goodrich Co., for Wright Air Development Center, U. S. Air Force, and was published in September, 1956. It describes screening of promising radiation damage inhibitors (Anti-Rads) for elastomeric compounds and compounding ingredients, in which 91 Anti-Rads were compounded, cured and irradiated in preparation for physical tests designed to uncover the most effective chemical structures for inhibition of radiation deterioration. The 87 page report is priced at $2.25.

A search for thermally stable polymeric materials is dealt with in *Copolymers of 1,1 - Dihydroperfluorobutyl Acrylate with Some Vinyl Silanes*, by E. C. Stump, Jr., Wright Air Development Center, U. S. Air Force. The report describes experiments in which an elastomer is sought which has high-temperature resistance and improved resistance to the deteriorating and swelling effects of fuels and oil for use in advanced high-speed aircraft and missile systems. PB 131375, a 24 page report, was published in August 1957 and is available for 75c.

R. A. Guzzi, Picatinny Arsenal, U. S. Army Ordnance Corp., prepared *Dilute Solution Techniques for Styrene-Methyl Methacrylate Graft Copolymer and its Precursors*. This report, PB 131261, deals with a series of tests in which it was determined that dilute solution techniques can be adapted to the study of styrene-methyl methacrylate graft polymers and their precursers. Priced at 50c, the 20 page report was published in April, 1957.

A Study of the Thermal Decomposition of Methane, by F. W. Cagle, Jr., University of Utah for Air Force Office of Scientific Research, deals with experiments in which, based on an examination of literature on the homogeneous pyrolysis of methane, a mechanism is proposed for the early stages in the decomposition of methane. A discussion of the nitric oxide inhibition data is included. The 12 page report, PB 121450, was published in March, 1956, and is priced at 50c.

► Franklin Institute Laboratories, Philadelphia, Penna., has issued a new booklet entitled "Product Research and Development", which describes services offered by the laboratories in this field.



U. S. Rubber Displays Tire Building Machine

► This 10-ton, automated tire building machine is now producing uncured white sidewall tires in a Rockefeller Center show window for the U. S. Rubber Co., New York, N. Y. The big machine, over ten feet tall, is being operated on a production basis at the U. S. Rubber exhibit hall to demonstrate how U. S. Royal tires are built. Barrel-shaped, uncured tire carcasses are turned out by the huge production machine. These carcasses are then shipped to one of the company's five tire plants for final shaping and curing in a bag-o-matic press. This final step in tire manufacture is demonstrated at the exhibit hall by a model bag-o-matic unit. Other highlights of the exhibit include reinforced plastic paneling for architectural use; a model of an earth satellite; a collapsible rubber shipping container, 32 feet long, that holds over 2,000 gallons; a sleek, reinforced plastic outboard cabin cruiser, and a cut-away auto chassis showing new rubber and plastic automotive products. Additional displays also show hundreds of the 30,000 products made by the rubber company for use in the home, on the farm, and in industry.

SPI Plans Exposition-Conference

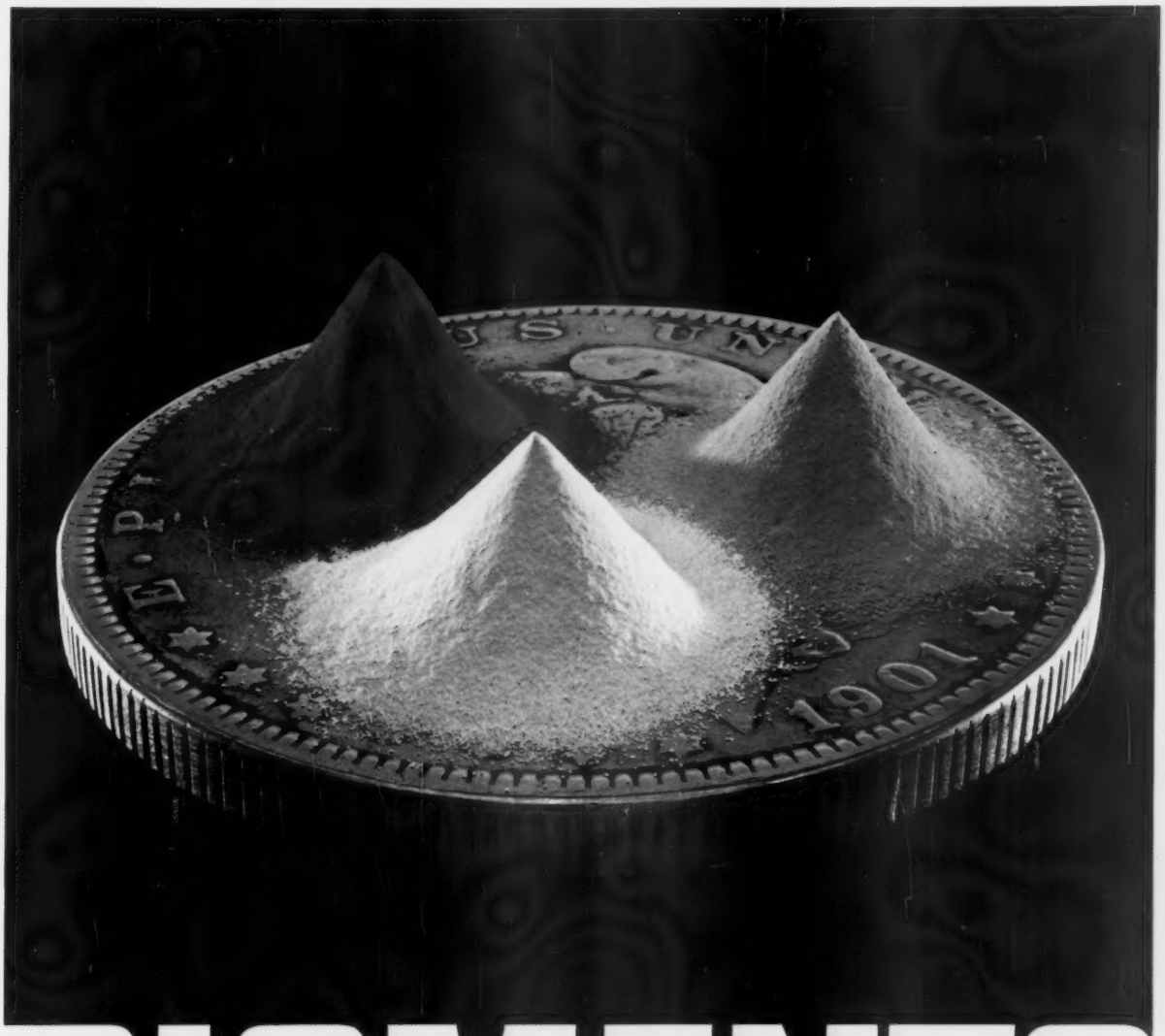
► Society of the Plastics Industry, Inc., has announced that the Eighth National Plastics Exposition and the 1958 Annual Conference will be held concurrently in Chicago, Ill., from November 17 to 21, in observance of the 90th anniversary of the plastics industry. John J. Bachner, president of Chicago Molded Products Corp., has been named chairman of the Exposition and W. D. McKay, Keolyn Plastics, Inc., has been appointed general chairman for the Conference which will be held in the Hotel Morrison. More than 200 exhibits showing what's new in plastics materials, methods, manufacturing equipment, techniques and products will be displayed by members of the SPI at the Exposition in Chicago's Amphitheatre. The SPI plans to dramatize the important historic milestones that have contributed to the steady expansion of the $2 billion industry over the years. Improving and expanding the marketing and distribution facilities of major segments of the plastics industry will be objectives of the Exposition. "Plastics For Profits" is to be stressed as the theme of both the Exposition and the Conference which will show how new methods, machines and techniques are effectively helping plastics manufacturers stem mounting costs.

Modifies Licensing Program

► Mobay Chemical Co., New York, N. Y., has announced a modification of patents relating to polyurethane foams, the most significant feature of which is the elimination of the requirement that licensees pay $40,000 for technical information. In order to avoid inequities, the company has offered licensees who paid $40,000 for such information an opportunity to substitute the new agreement for the one they now have. Licensees under the previous patent program will be permitted to apply the $40,000 against any future royalties that may become due under the new agreement. The company stated that emphasis in the urethane industry has been shifting away from developmental technology and toward application and marketing. Mobay's aim in changing its program is to offer an arrangement tailored to the needs of an industry which is interested in stimulating further growth of the urethane foam markets.

American Enka Names Dochety

► Industrial Sales Department of the American Enka Corp., New York, N. Y., has appointed Paul E. Dochety as a technical sales representative. Before joining the company, Mr. Dochety was technical representative for the Special Products Division of the Lord Manufacturing Co. and prior to that was a development engineer in the Textile and Adhesive Development Department of the Firestone Tire and Rubber Co. He graduated from John Carroll University with a B. S. degree in 1950 and is an active member of the Rubber Division of the American Chemical Society and the Akron Rubber Group.



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NATIONAL POLYCHEMICALS, INC.

Wilmington, Massachusetts

FBRAM Issues Natural Rubber Guide

► The Federation of British Rubber and Allied Manufacturers, 43 Bedford Square, London W. C. 1, England, has published a guide to the control of weight and quality in natural rubber deliveries, entitled "Natural Rubber Grades and Contracts". The booklet, a 30 page volume priced at about 34c (U. S. A.), was compiled for the Federation by a subcommittee of the Materials Supply Committee of the Tyre Manufacturers' Conference, Ltd., utilizing the Pirelli organization's notes on quality and weight control of natural rubber. It suggests the procedure that will ensure that the quality of rubber deliveries is up to the standard contracted for. Although the publication refers specifically to contracts of the Rubber Trade Association of London, the principles are also applicable to purchases made on the basis of contracts drawn up by other recognized world rubber markets.

Because natural rubber is an agricultural commodity, its purchase is complicated and difficult. There are variations in methods of production, soil and climate, and packing and shipping. An increase in faulty deliveries and packing since the war has emphasized difficulties in checking quality and weight of natural rubber at various points between the producers and the factory. Over 40 per cent of the rubber bought through the New York market in 1956, nearly 160,000 tons out of a total of 380,000 tons, was below the standard contracted for, according to Stuart C. Covell, director of the FBRAM.

These discrepancies have become one of the most important subjects of meetings in Singapore, the United States and the United Kingdom, and have also been one of the major items discussed at the annual meeting of the International Rubber Study Group. However, at present consumers can protect themselves only by proper use of agreed international quality and packing standards along with safeguards provided to the buyer in contracts based on the official contracts of the RTA of London or other recognized world markets, it is believed. Through knowledge of the grades and by inspection of natural rubber deliveries, a consumer can determine whether he is getting the type and grade of rubber he has ordered.

Enjay Butyl Manual—Volume II

► Enjay Co., Inc., New York, N. Y., has released Volume II of the *Enjay Butyl Manual*. This volume contains the first section on general compounding and presents a selective yet comprehensive study of accelerators, carbon blacks, mineral fillers and process oils in Enjay butyl. Compiled in loose-leaf form, the manual presents its information in a series of tables. The second section of this volume is expected to be ready shortly and will classify by hardness many of the compounds contained in the first section. The *Enjay Butyl Manual* is available through the company at 15 West 51st Street, New York 19, N. Y.

Urethane Foam Test

► Research chemists at Allied Chemical & Dye Corp. gave in to their curiosity recently. What would happen, they wondered, if they were to drop an egg 10 feet to a block of flexible urethane foam? Their ostensive purpose: to test the cushioning effect of this new synthetic material. Hard-boiled eggs, the chemists discovered, worked fine. Encouraged, they

cautiously dropped a raw egg—shown in photo above. The outcome? It too, survived. Urethane foams are produced in a wide range of densities by combining Allied Chemical's "Nacconate" diisocyanates and "Plaskon" polyesters. Scene of the egg experiment: urethane application research laboratory of the National Aniline Division in Buffalo, N.Y.

Transfers Controlling Interest

► Tennessee Gas Transmission Co., Houston, Texas, has transferred controlling interest in Grand Central Rocket Co., Redlands, Calif., to Petro-Tex Chemical Corp., also located in Houston. Petro-Tex, jointly and equally owned by Tennessee Gas and the Food Machinery and Chemical Corp., San Jose, Calif., is said to be the nation's second largest producer of butadiene. Tennessee Gas acquired a 93.4 per cent controlling interest in Grand Central Rocket several months ago. The latter is engaged in the development and production of high-energy solid propellants for rockets and in the design, development and proving of solid propellant rocket motors. Concurrent with the transfer of controlling interest in the rocket company, additional funds were invested by Food Machinery and Chemical in Petro-Tex to help finance activities of Grand Central Rocket.

Columbia-Southern Appointments

► Columbia-Southern Chemical Corp., Pittsburgh, Penna., has appointed Dr. Hans Jorg Wartmann as a research chemist and Roy E. Stack as a chemist at the firm's Barberton, Ohio, research laboratory. Robert R. Meltz, has been assigned to the rubber laboratory as a senior compounding chemist.

Illinois Tech Appoints Two

► The appointment of Dr. Aristid V. Grosse and Dr. Elbert C. Lathrop as technical consultants to its Chemistry and Chemical Engineering Department has been announced at Armour Research Foundation of Illinois Institute of Technology, Chicago, Ill. Dr. Grosse, who was formerly president of the Research Institute of Temple University, was one of a select group of Russian scientists invited to come to the U. S. in the early 1930's to work for the American petroleum industry. Their work on the processes of polymerization, alkylation and isomerization contributed to the development of high-octane aviation gasoline. With co-workers, he proved the slow neutron fission of U-235, developed U-235 separation processes and disclosed cosmic ray carbon. He has been active in high temperature research since 1948, when he was named to the Temple University post. Dr. Lathrop, formerly of the Northern Regional Laboratories of the U. S. Department of Agriculture in Peoria, Ill., was an assistant in the Chemistry Departments at Purdue University and at Pratt Institute. He was also previously associated with DuPont, S. P. Sadtler & Son, Inc., the Celotex Co., the Crown Willamette Paper Co. and the Crown Zellerbach Corp. Dr. Lathrop received A. B. and D. Sc. degrees from DePauw University, and a Ph. D. from American University.

New Poly-Dispersions Plant

► Wyrough and Loser, Trenton, N. J., have announced the completion of new and fully operative facilities at Newton, Penna., for the production of the "Poly-Dispersions" line of chemicals. The company stated that a new price schedule reflecting about a 20 per cent savings will become effective immediately on all unfilled and future orders. With the new plant, most deliveries on orders for standard products can be shipped within a week or less after receipt. The company also states that special products, including custom blends, now can be made in any quantity and that quotations and laboratory samples are available upon request. The firm also announced the addition of "PSD-85", an 85 per cent sulfur dispersion in a Polyisobutylene binder in slab form, to its list of standard Poly-Dispersions.

Hodag Names Field Engineer

► Richard Anderson has been named field engineer for antifoams, flocculating agents and other surface-active agents for the Hodag Chemical Corp., Chicago, Ill. His territory includes Wisconsin, Minnesota, and parts of Michigan and Iowa. Mr. Anderson will specialize in serving the adhesives and paint industry, the food processing industry and the pulp and paper industry. He was previously associated with the Thiele Kaolin Co., Benlo Chemicals, and the U. S. Movidyn Corp. Mr. Anderson holds a B.S. degree in chemical engineering from the University of Wisconsin.

ADHESIVES ⇨ ⇨ NEW MARKET

FURNITURE: Here a Drexel Furniture Company supervisor checks a built-up laminated core for diningroom furniture using P-631 Plyamine. Gluing is an important factor in Drexel's operation, which runs as high as 120 surface feet every eight minutes, ten hours a day. (Reichhold Chemicals, Inc.)

RADIOS: A printed circuit made up of electrolytically deposited copper on an epoxy-based adhesive—placed on an epoxy-impregnated fiber glass baseboard.
(Rubber and Asbestos Corporation)

PLYWOOD: The first assembly process in the production of 5- or 7-ply fir plywood panels. Sheets of veneer are fed through rollers bathed in a continuous flow of adhesive.
(United States Plywood Corporation)

Adhesives bond together a great new market

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ADHESIVES AGE NEW MAGAZINE

Ramsey

Goodrich Chemical Appoints Two

Schloenbach

► Grover S. Ramsey has been appointed sales representative in Michigan for B. F. Goodrich Chemical Co., Cleveland, Ohio, while William H. Schloenbach has been named to represent the firm in the New York area. Mr. Ramsey will make his headquarters in Detroit, Mich. The new sales territory was created principally to give better service to the automotive industry, according to the company. Mr. Ramsey joined Goodyear Chemical in 1954 as sales representative in the Northern New York Area, with headquarters in Schenectady. He attended Oregon State College and was graduated from the University of Oklahoma in 1944 with a B.S. degree in chemical engineering. He is a member of the American Chemical Society and its Rubber Division, the Technical Association of the Pulp and Paper Industry, and the Buffalo Rubber Group.

Mr. Schloenbach, who will make his headquarters in Schenectady, N. Y., was graduated from Georgia Tech with a B.S. in chemical engineering and Cleveland Marshall Law School with a Bachelor of Laws degree. He joined Goodrich in 1950 in a technical position and subsequently became development engineer in the products application laboratory in Avon Lake, Ohio. Mr. Schloenbach was transferred to Cleveland in 1954 as a product engineer in the Hycar nitrile rubber sales department. He is a member of the American Chemical Society, the Akron Rubber Group, Technical Association of the Pulp and Paper Industry, and the Cleveland Junior Chamber of Commerce.

Jean Le Bras

Le Bras Receives Colwyn Medal

► Dr. Jean Le Bras, inspector general of the Institut Francais du Caoutchouc, Paris, France, was awarded the Colwyn Medal at a meeting of the Council of the Institution of the Rubber Industry, which was held in London on July 22. Dr. Le Bras was cited for conspicuous service of a scientific character, particularly with regard to his work on anti-oxidants, biosynthesis and chemical derivatives of natural rubber. Also cited by the group, was H. Willshaw, O. B. E., chief consulting engineer for the Dunlop Rubber Co., Ltd., and director and general manager of the Dunlop Advisory Service, Ltd. Mr. Willshaw was awarded the Hancock Medal for outstanding services in the field of education.

Thermoid Sues Former Executive

► Thermoid Co. of Trenton, N. J., a Delaware corporation, has filed a $4,100,000 damage suit in district federal court in Charlotte, N. C., against George S. Fabel, president of the company from September 1952 to July 1955. Thermoid charges that Mr. Fabel, in conspiracy with his predecessor as president, Frederic D. Schulter, and three other former executives, filed false reports of the company's financial condition with the New York Stock Exchange, in order to increase the value of their personal holdings of Thermoid stock. A federal grand jury in the Southern District of New York has indicted Mr. Fabel, Mr. Schulter, Russell H. Temple, Robert R. Stevenson and Thermoid for falsifying the firm's income and excess profits tax returns for 1951, 1952 and 1953. They are charged with falsifying company records to deprive the government of $625,726 in income and excess profits taxes over the three year period. In its damage suit, Thermoid has asked for $3,600,000 as compensatory and remedial damages and $500,000 punitive damages and "costs and disbursement of this action".

New Kessler Unit on Stream

► Kessler Chemical Co., Inc., Philadelphia, Penna., has started production at its second manufacturing plant, which is located at Cottman Avenue and State Road in Philadelphia. The new facility is said to double plant capacity and to provide improved production units for glycerol monostearates, synthetic waxes, surface active agents and other fatty acid derivatives.

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West Coast News

► Shell Chemical Corp. has announced the appointment of G. S. Williamson, formerly manager of the ammonia plant at Pittsburg, Calif., as manager of the company's synthetic rubber plant at Torrance, succeeding Maarten Voogd, who will retire at the end of the year. Frank G. Watson, assistant manager of the company's Manufacturing Development Department in New York City, will succeed Mr. Williamson as manager at Pittsburg.

A chemical engineer from the University of British Columbia, Mr. Williamson joined Shell Oil of Canada in 1936, as a laboratory helper in the Shellburn refinery. Over a period of 15 years, he moved through positions of increasing responsibility and in 1951, he was appointed superintendent of the chemical plant at the Montreal refinery. Four years later, he joined Shell Chemical as Superintendent at the Torrance plant, and was named to his present position in 1957.

Mr. Watson, a graduate of Princeton University with a degree in chemistry, joined the company in 1942 as a chemist at the Dominguez, Calif., plant. He later worked at plants in Dumas, Texas, which was operated by Shell Chemical for the government during World War II, and Houston. He was named plant superintendent at Houston in 1954, and a year later, he became assistant to the vice-president, manufacturing, in New York City. Mr. Watson was appointed to his present position in 1956.

Mr. Voogd, who has been associated with Shell for 29 years, will leave his Torrance position in October to handle a special European assignment. On his return, he will move to Ojai, Calif., where he will establish offices as a manufacturing consultant.

Shell has also announced that C. R. Greene, a research chemist with the Shell Development Co., has accepted a year-long training assignment with the corporation. He was to have assumed his new duties in the Plant Technological Department of Shell Chemical's synthetic rubber plant at Torrance on August 25. Mr. Greene attended the University of Chicago, where he received his B.S. degree in biochemistry in 1948, his M.S. in organic chemistry two years later and his Ph.D. in physical and organic chemistry in 1952. He joined Shell Development in 1954.

► General Tire and Rubber Co., Akron, Ohio, has added a new rubber manufacturing installation to its West Coast operations at a cost of $2,250,000. Located on an 85 acre tract near La Puente, Calif., the new plant is General Tire's first rubber-producing operation west of the Rocky Mountains and the first step in a long-planned West Coast expansion program. Earl H. Schaub, associated with General Tire for 19 years, has been named manager of retread rubber sales at the unit, which will serve the Western United States.

The facility consists of two one-story buildings with a total of 135,000 square feet of floor space and is designed to fit into future expansion plans. It houses manufacturing machinery for the production of retread rubber; provides space for what is said to be one of the largest and most complete Kraft recapping operations in the nation, and includes warehouse facilities for the Tire Division as well as divisional sales office headquarters, which will be headed by J. S. Hanse.

► Rubber Technology Foundation of the Los Angeles Rubber Group is offering several credit and non-credit courses in rubber technology at the University of Southern California this fall. Applicants for non-credit courses will register at the beginning of classes on October 2. Registration for credit courses will be from September 17-20 and classes will begin the week of September 22. A schedule of the courses follows:

Non-Credit Courses: No prerequisites.

Chemical Engineering 015A: Basic Rubber Technology, lecture course, meets Thursday, 7:00-10:00 p.m. Fee: $25.00. Mr. L. E. Peterson to conduct. Designed for non-technical personnel.

Credit Courses: Prerequisites as noted.

Chemical Engineering 442: Rubber Technology I. Lecture course, 2 units, meets Wednesday, 7:00-8:40 p.m. Fee: $50.00. Dr. E. G. Partridge to teach. Elementary organic chemistry is a prerequisite. Designed for chemical engineering curriculum students and for technical personnel in industry.

Chemical Engineering 443AL: Rubber Technology Lab, 2 units, meets Monday, 6:15-10:00 p.m. Fee: $50.00. Mr. Stoltz to teach. Elementary physics is a prerequisite.

Chemical Engineering 445L: Latex Technology, 2 units, lecture demonstration, meets Thursday, 7-8:40 p.m. Fee: $50.00. Dr. Partridge to teach. Rubber Technology I, or an equivalent, is prerequisite.

► The Los Angeles Rubber Group has announced that its board of directors has accepted the following new members: Frank Ralph Long (Interstate Rubber); Joseph Stecher (Bettis Rubber); Claude G. Morrison (Industrial Rubber Cement); John A. MacKay (Phillips Chemical); Paul Herman Semler (United Engineering); John P. Ballesio (Firestone); Ernest T. Pellegrino and Thomas E. Buckles (Plastic & Rubber Engineering); Raymond Richard Pariseau (Custom Rubber Mix); Norris Bettis and Roy J. Bristol (Flintkote).

At the Tlargi May dinner meeting, Dr. Robert Evans Vivian was honored, and was also named an honorary life member of the group by a unanimous vote. During the meeting, Dean Vivian announced his retirement as Dean of Engineering at the University of Southern California. A Tlargi member since 1952, he has served on the educational committee three times and on the Foundation Advisory Board since it began.

The group's fall program has been scheduled and includes two dinner meetings, to be held on October 7 and 14, and a Christmas party, scheduled for December 12.

Tlargi has also announced that members of the group who would like to make a contribution to the Tlargi Memorial Fund in memory of Gabriel G. Balazs, a former chairman of the group who died on May 20, may submit contributions to Bob Short, c/o Kirkhill Rubber, Brea, Calif.

► An open house commemorating the opening of new laboratory facilities at Hawthorne, Calif., was held recently by American Latex Products Co. The new research building for research and development of new polyurethane foams and plastics, has been named for A. L. Freedlander, chairman of the board for the Dayton Rubber Co., affiliate of American Latex.

► Regency Rubber Products has acquired the facilities of Rubber Processing, Inc. and Rubber Products, Inc., Gardena, Calif. The company will manufacture a line of proprietary items, automotive accessories, swimming equipment and custom molded mechanical items. Mort Goldman, formerly with Zenith Rubber, has been appointed plant manager.

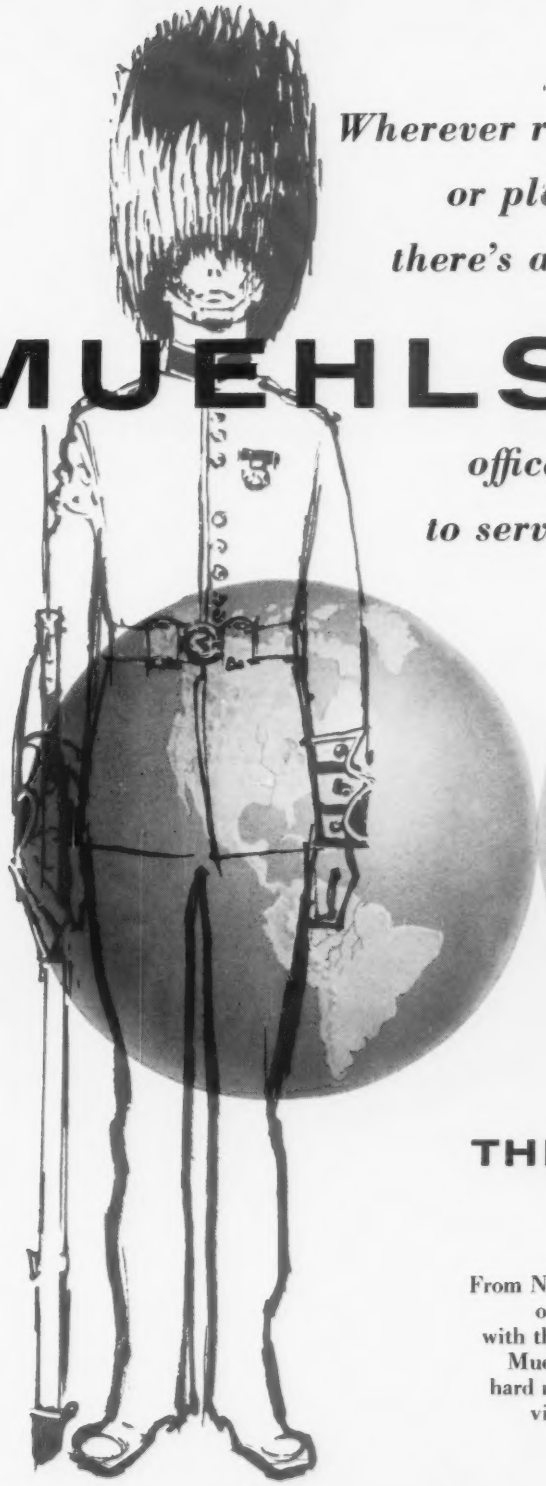
► Midwest Rubber Co. has announced that Dan E. Lukach has been named office manager and purchasing agent, succeeding Tom Corcoran, who has resigned.

► W. E. Voit, president of W. J. Voit Rubber Corp., has been elected to the Board of Trustees of the Bankers Life Insurance Co. of Nebraska.

► Kirkhill Rubber Co. has appointed Dr. Henry Palmer as technical director and Carl Edwards as chief development engineer.

Steel Guard Industrial Tire

► Goodyear Tire and Rubber Co., Akron, Ohio, has introduced what is said to be the first pneumatic industrial tire with steel cord breaker construction. Named the "Steel Guard Industrial", the tire features a puncture resisting barrier of two criss-crossed steel cord breaker strips, locked in place beneath the tread by specially-compounded rubber. Designed primarily for use in operations where sharp puncturing objects are a hazard such as in mines, scrap metal yards, steel plants and similar industrial areas, the tire has been subjected to more than two years of in-use tests. The new Steel Guard Industrial tire is produced in Super Rib and Industrial Lug designs and is available in 4.80/4.00-8, six-ply rating in the Super Rib design, and in sizes 6.00-9, 10-ply; 6.50-10, 10-ply; 7.50-15, 10-ply; 7.00-12, 12-ply, and 7.50-10, 12-ply in the Industrial Lug design.



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Obituaries

William F. Durand

► Dr. William Frederick Durand, "dean of American engineers," pioneer in the field of aviation and a past president and Honorary Member of the American Society of Mechanical Engineers, died on August 9 after a brief illness. He was 99 years old. Editor of and contributor to the six-volume definitive work of the principles of gases in motion, "Aerodynamic Theory", his contributions to hydrodynamics and aerodynamics are considered fundamental to the field. He received the Guggenheim Medal in 1935, presented jointly by ASME, the Society of Automotive Engineers and Institute of the Aeronautical Sciences, for "notable achievement as a pioneer in laboratory research and theory of aeronautics." In 1944, the National Academy of Sciences presented him with the John J. Carty Gold Medal for notable leadership in engineering, and in 1945, he won the ASME Medal for "his contribution in hydrodynamics and aerodynamic science." For the past few years Dr. Durand lived in retirement in New York.

Wilbur S. Daley

► Wilbur S. Daley, automotive sales manager of B. F. Goodrich Sponge Products Division, Shelton, Conn., died recently at the Grace-New Haven Community Hospital following an extended illness. He was 57 years old. A native of Peabody, Mass., Mr. Daley graduated from Dartmouth in 1924 and received a Master's in English from Harvard University in 1925. He was an instructor at Canterbury School in New Milford before coming to Goodrich in 1934. Mr. Daley was active in community affairs and was a former president of the Shelton Kiwanis Club. He was a charter member of the Shelton Chamber of Commerce, a member of the Shelton Housing Authority, and the board of directors of the Derby-Shelton Community Center. He is survived by his wife, a son and daughter.

Hugh Bullock

► Hugh Bullock, who retired in 1955 from the presidency of the Tyer Rubber Co., died on August 19 in Lawrence General Hospital, Andover, Mass., after a long illness. He was 78 years old. Mr. Bullock joined Tyer Rubber in 1927 and became its president in 1935. He was a director at his death. Mr. Bullock was a former director of the Rubber Manufacturers Association. In World War II and the Korean conflict he was a Government consultant on the rubber industry. He had been active in community, educational and church affairs. In World War II he was a member of the Andover Selective Service board. Mr. Bullock is survived by his wife and three daughters.

Norman S. Hope

► Norman S. Hope, former partner, senior vice-president and director of the Wellington Sears Co., died in his home in New York, N. Y., on August 14. He was 81 years old. Mr. Hope was formerly manager of the Chicago, Ill., office of N. Boynton & Co., predecessor of Wellington Sears. He became a partner in the new firm in 1922, was named senior vice-president in 1931, and retired in 1943. For several years he continued to serve the company as a director and a consultant. He was a former member of the executive committee and a director of the Association of Cotton Textile Merchants of New York, and was chairman of the Cotton Goods Division of the Greater New York Fund for several years. He is survived by his wife and two sons.

Raymond L. Lasser

► Raymond L. Lasser, president and director of Republic Die & Chemical Co. and vice-president and director of the Harwick Standard Chemical Co., died of a heart attack on August 11 in Akron General Hospital. He was 65 years old. Mr. Lasser was born in Barryville, N. Y., and came to Akron 14 years ago to join Harwick. He was a member of the 25-Year Club of the Division of Rubber Chemistry of the American Chemical Society. Mr. Lasser was active in the Akron Rubber Group, the City Club, and the Congress Lake Club. He is survived by his wife and a son.

Claude C. Mace

► Claude C. Mace, retired employe of the Goodyear Tire & Rubber Co., Akron, Ohio, died on June 15, in Miami, Fla., where he had been living since his retirement. Mr. Mace is survived by his wife, four sons and a daughter.

Charles F. Holcomb

► Charles Frederick Holcomb, board chairman and former president of the Canfield Rubber Co., Bridgeport, Conn., died at his home in that city on June 20. He was 92 years old.

Named Technical Representative

► John C. Young, formerly of Dow Chemical Co., has joined the Polyco-Monomer Department of the Borden Chemical Co., as technical sales representative in the Ohio area. He will make his headquarters in Cleveland. Mr. Young, who has approximately seven years of experience in the paper, paint and chemical fields, assumed his new responsibilities following a training program at Borden's laboratories in Leominster, Mass.

New York Holds Golf Outing

► Approximately 240 members and guests attended the Annual Golf Tournament of the New York Rubber Group, held at the Winged Foot Golf Club in Mamaroneck, N. Y., on August 5. The facilities of the club were excellent and the weather was perfect. The club, incidentally, will be the scene of the National Open Golf Tournament next year.

Honors for low gross for members went to James F. Wernersbach (Enjay) with a 74. Wes Curtis (Naugatuck Chemical) was second with a 75 and Felix Salamon was third with a 78. By winning top honor Mr. Wernersbach secured a leg on the Nesbit Golf Cup. Permanent possession of the cup is secured by three-time winners. Both Mr. Curtis and Mr. Salamon also have one leg each on the cup. Honors for low gross for guests went to W. Fenwick, Chan Whittington and C. Rueckert, respectively. Mr. Fenwick recorded a 73. High gross winners were R. Mineo and T. Math.

The putting contest ended in a tie between Mr. Wernersbach and Mike Seventko (Okonite), with Mr. Salamon as runner-up. Attractive prizes were awarded to each of the contest winners. In addition, golf balls were awarded to the following for the kickers' handicap: J. Fielding, J. Snyder, J. C. Richards, E. Diener, W. E. Huether, W. Weber, D. True, K. Cary, W. Jones, J. McVay, A. J. Zerillo, W. Gleason, P. Mester, G. Hassard and J. Walsh. Golf balls were also given to some 42 participants who scored birdies. Over and above these awards and prizes, several door prizes went to holders of lucky number tickets.

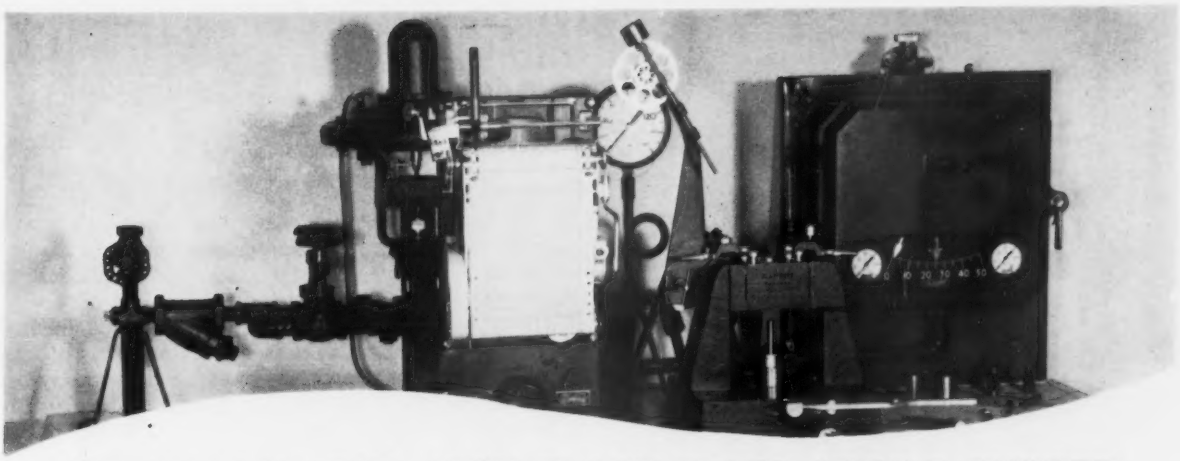
The Golf Committee was headed by Ralph DeTurk (Whittaker, Clark & Daniels) as *Chairman*, with D. H. McCondichie (Marine Magnesium) as *Treasurer*. Other committee members included H. P. Pryor (R. E. Carroll), C. J. Lewis (U. S. Rubber), H. J. Due (St. Joseph Lead), A. H. Woodward (DuPont), M. A. Durakis (General Cable), B. A. Wilkes (Godfrey L. Cabot), L. J. Koch (Westwood Chemical), George Vacca (Bell Telephone Labs), and Fred Cooke (Cooke Color & Chemical).

GPE Subsidiary Renamed

► GPE Controls, Inc., is the new name of the former Askania Regulator Co., a major subsidiary of General Precision Equipment Corp., New York, N. Y. Company officials said the name change reflects a broader line of engineering services and products for automatic process control available to industry. Certain products and technical services of three other GPE subsidiaries, Librascope, Link Aviation, and Kearfott Co., have been integrated into the new unit.

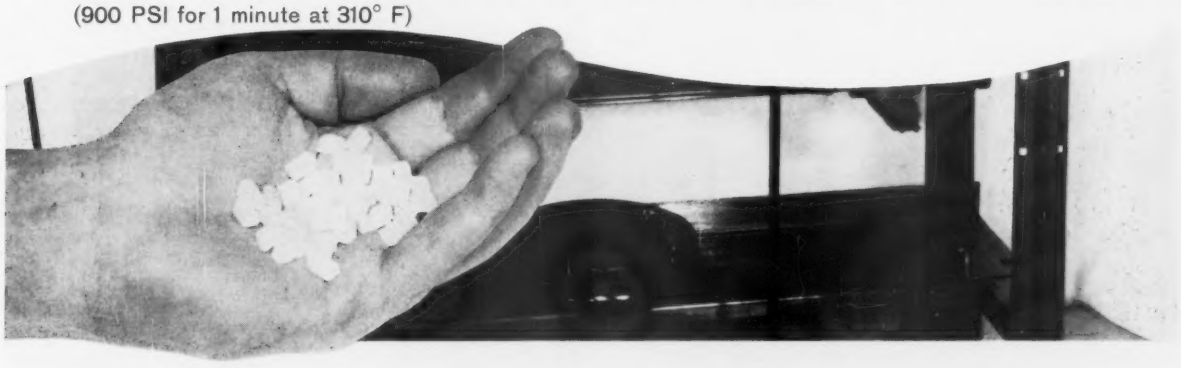
Akron Council To Meet

► Akron Council of Engineering and Scientific Societies has scheduled its annual meeting for October 9 in the Sheraton-Mayflower Hotel, Akron, Ohio. William A. Patterson, president of United Air Lines, has been secured as principal speaker for the meeting.



Compound No. 72B—HIGH BLACK-FILLED NITRILE RUBBER

	A	B	C	D
"A-C" Polyethylene, Parts:	0.0	2.5	5.0	10.0
Rossi-Peakes Flow Test, Inches (900 PSI for 1 minute at 310° F)	0.70	0.80	0.91	1.44



Flow test shows what A-C† Polyethylene can do

The red figures above prove the dramatic increase in flow properties and overall processibility that "A-C" Polyethylene can achieve in your compounding of nitrile, neoprene, butyl and other hard-to-mill rubbers.

We started with a high black-filled nitrile rubber and measured its flow properties by the Rossi-Peakes test. Then we added 2½, 5 and 10 parts of "A-C" Polyethylene per 100 parts of rubber to the same stock. The Rossi-Peakes figures show the vast improvement in flow characteristics.

"A-C" Polyethylene is more than just a lubricant. It is also a tack modifier . . . an anti-shrinking and anti-blooming agent . . . a powerful processing aid. By using it, you can improve mold flow and mold release, cutting your operations costs in several ways:

1. Speed up output, reducing labor costs.

2. Reduce—often eliminate—rejects or "seconds" in heels, soles, mechanicals or intricately designed products requiring multiple cavity molds.

3. Make economical use of highly loaded rubbers which could not be commercially molded otherwise.

Success stories abound. "A-C" Polyethylene is now widely used in neoprene, GRS, butyl, nitrile and "Hypalon." By adding it to your "problem" compounds, you can make them behave themselves—with highly profitable results. Write for technical advice on applying "A-C" Polyethylene to your products.

†Trade mark of Allied Chemical

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Superior scorch protection when the heat's on . . .

MAGLITE® D

The performance-proved magnesium oxide

You can depend on MAGLITE D to provide instantaneous acid acceptance in Neoprene formulations. This not only means superior scorch protection, but also results in:

1. Reduced bin-cure and longer uncured stock life.
2. Greater flexibility in mixing speed and mill warm-up time and temperature.
3. Safer, faster tubing and wire covering.
4. Better mold-flow to permit such advantages as improved stock-knitting, reduced pre-cure laminations and shorter curing cycles at higher temperatures.

Stocks are quickly available from 15 strategically located warehouses. For samples of MAGLITE D, K, L, and M, write MERCK & CO., INC., Marine Magnesium Division, Department RA-9, Rahway, New Jersey.

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New Goods

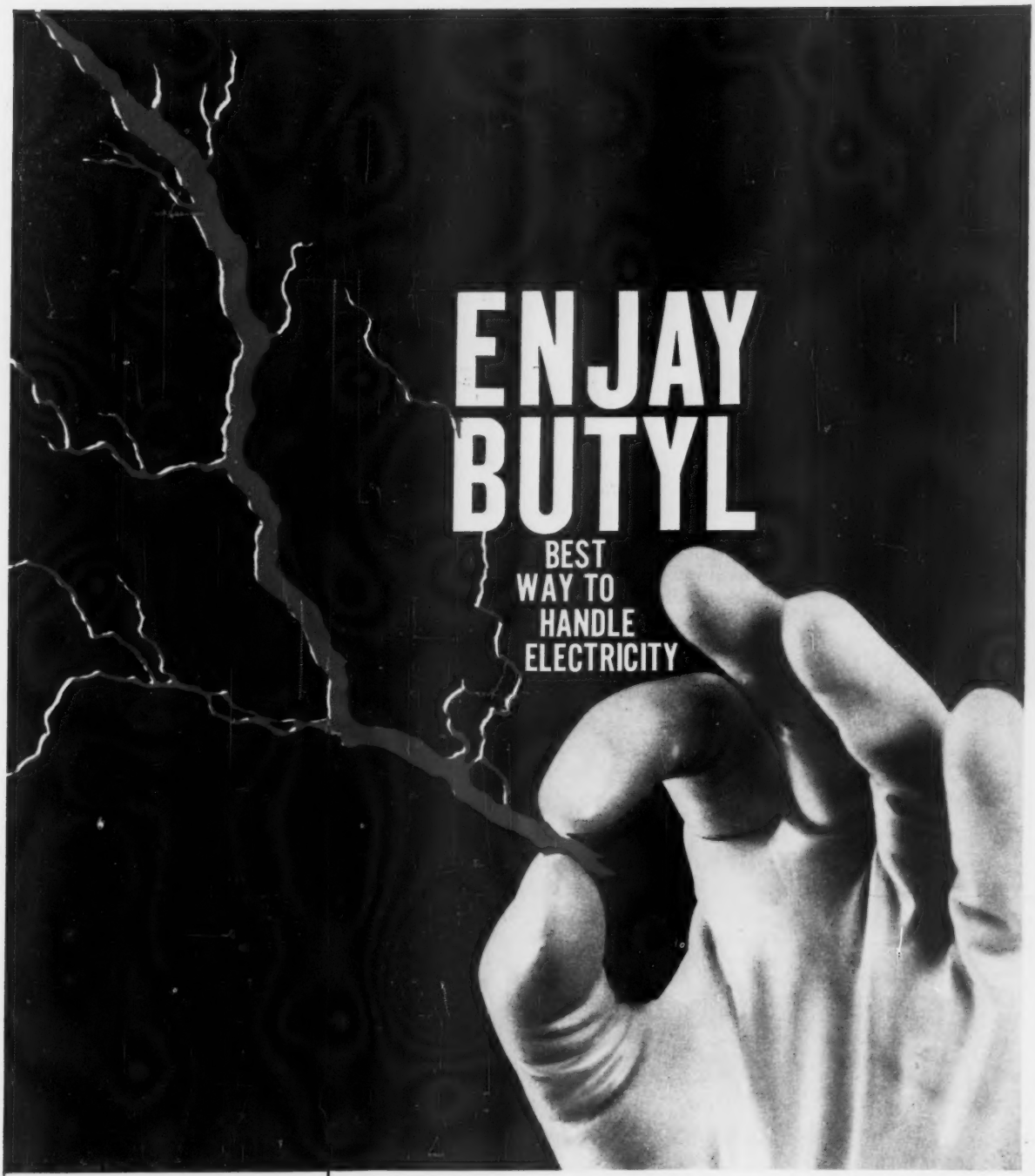
Cloisonne Vinyl Tile

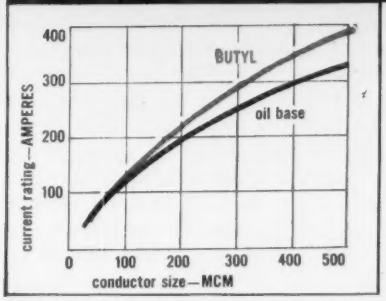
► A new line of quality vinyl tile, called "Cloisonne" because of a unique three-dimensional surface design effect, has been unveiled by the Goodyear Tire & Rubber Co., Akron, Ohio. Company officials said the surface design has been achieved by utilization of an intricate manufacturing process that combines hundreds of vinyl chips made from several basic colors. The company said that the new production technique results in an unusually durable, all-vinyl, homogeneous tile, with each color chip set off individually in such a manner that a three-dimensional surface effect is produced. Cloisonne is styled to meet the tastes of both decorators and homeowners and is available in 11 colors, mostly pastels, in residential gauge only. Goodyear has also developed a new economy, all-vinyl counter topping material that features a linen or frost design. This new material is being produced in 36- and 45-inch roll widths with a choice of colors in gray, green, yellow or tan. In addition to this, the firm has announced that a Romance pattern and two cork styles have been added to the low-cost, all-vinyl "No-Scrub" tile line. All of the new vinyl materials are now in volume production and shipments are available to dealers.

Rubbermaid Kover-All

► Rubbermaid, Inc., Wooster, Ohio, has introduced a new style, one piece covering for automobile rear floors, called the "Kover-All". Designed to fit all cars, the Kover-All is similar to the front floor StyleLiner, giving one piece underfoot protection, and has the same exclusive design to catch and hold water, mud and dirt.

Nubbing underneath, holds the covering in place, which is said to be easy to remove, clean and to replace. Heat molded for detail, luster and definition, the new product is made of high quality rubber to provide long service life, Rubbermaid says. The Kover-All is available in ten shades including red, blue, green, black, tan, brown, grey, white, light blue and light green, and is packaged in a three-color display box.





Butyl's outstanding resistance to heat allows considerably higher currents for any given conductor size.

Of all vulcanizable rubbers, Enjay Butyl offers the best electrical and dielectric properties. Butyl is the ideal material for wire and power cable, transformers, tapes, busbars and other insulation applications.

Butyl *also* offers outstanding resistance to weathering and sunlight . . . chemicals . . . abrasion, tear and flexing . . . superior damping properties . . . unmatched impermeability to gases and moisture.

Find out how this versatile rubber can improve your product. Call or write the Enjay Company, today!

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"the proven Accelerator Activator Since 1944"

BALANCE

RIDACTO is especially effective in equalizing the vulcanization of mixtures of SBR and natural rubber. RIDACTO is more active toward SBR and consequently serves to balance the vulcanization of the two rubber hydrocarbons.

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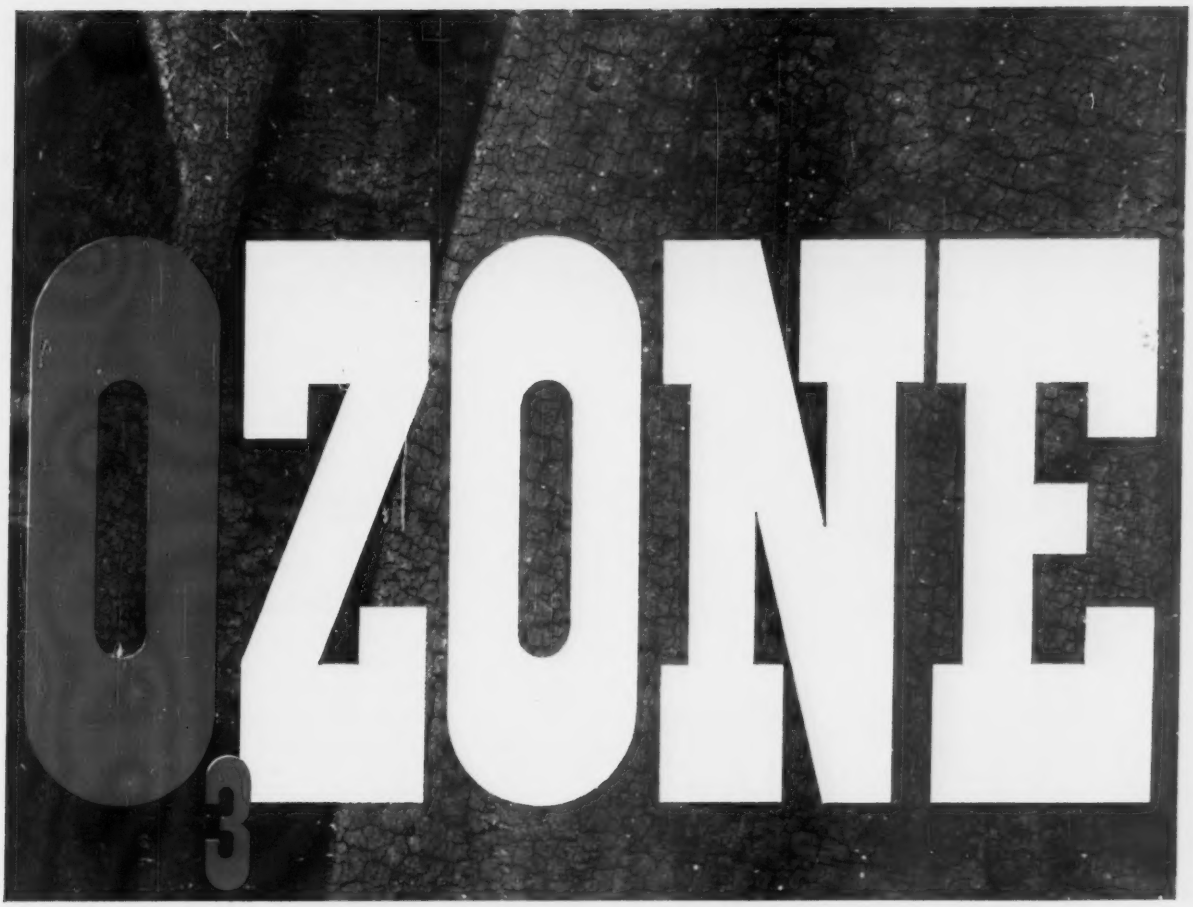
Industrial Rubber Floor Mat

► Industrial Rubber Products Division of Byron Jackson Tools, Inc., Los Angeles, Calif., has announced that the heavy-duty, 32-inch square "BJ Rubber Floor Mat" is now available for general industrial use. The new mat is said to protect the feet from dampness, cold, slipping and electrical shock. Its thousands of built-in

"shock absorbers" minimize fatigue of workers who stand in one position for long periods of time. The non-skid mat is divided into 16 eight-inch squares which can be easily cut apart to surface stairs and other small areas. Several mats may be laid together to cover larger working areas of any size. BJ Rubber Mats have undergone continuous outdoor use on oil drilling rigs from the subarctic oilfields of Canada to the boiling heat of the Middle East, withstanding the buffeting of thick-soled boots and heavy tools, the company said.

Underground Lawn Sprinklers

► Bubbler heads, all-rubber riser heads, sprinkler units, and a full line of 1¼-inch rubber pipe, couplings, tees and reducer tees are the new products that have been added to the all-rubber underground lawn sprinkling system manufactured by the Goodyear Tire & Rubber Co., Akron, Ohio. Bubbler heads are now available with the sprinkler system for flower and shrubbery beds that can be regulated to flood at a rate up to four gallons a minute. The sprinkler units are the result of an extentive joint development program with the Rain Jet Corp. in which four types of sprinkler units were adapted to the line of all-rubber heads. A full line of 1¼-inch rubber pipe, couplings, tees and reducer tees has been made available to simplify operation of the system on expansive lawns and estates. Installation of an all-rubber underground sprinkling system enables the home owner to custom make the layout to suit his own needs. Rubber pipe is flexible enough so that it can be run around trees and curved around bends, eliminating tedious cutting and fitting of metal pipe. Goodyear officials stated that the system is available for do it yourselfers, but recommends professional installation for maximum results.



How to arrest its attack on rubber products

Ozone attack is now recognized as the major cause of cracking and checking in stressed rubber products.

The mechanism of this type of deterioration is attributed to the chemical attack of ozone upon the carbon-to-carbon double bonds of unsaturated elastomers. Through a rather complex reaction the double bond is broken. This places additional stress upon adjacent chains and increases their sensitivity to ozone attack. Thus a continuing reaction occurs, leading to the development of fissures perpendicular to the direction of the stress.

To combat the deteriorating effects of ozone, rubber chemists have several approaches open to them:

(1) Addition of waxes which migrate to surface areas

(2) Protection of surface areas with an inert coating

(3) Incorporation of antiozonants

Of these three methods, the use of antiozonants is the most effective for rubber products under stress. Antiozonants are easily incorporated into the rubber during processing and slowly exude to the surface during use. Because they interrupt the chain-breaking reaction between ozone and unsaturated elastomers, antiozonants provide a continuing protection which cannot be equalled by any physical method.

Eastman's Eastozone antiozonants protect rubber products more effectively at lower cost than do other types of commercially-used antiozonants. Using Eastozone antiozonants, compounders often can cut antiozonant requirements in half and still get the same ozone resistance, measured by static or dynamic exposure tests.

Give your mechanical goods or tire stocks maximum service life at minimum cost by incorporating Eastozone antiozonants in your rubber recipes. Ask your Eastman representative for samples and a copy of Bulletin 1-102 "*Eastozone Antiozonants for the Rubber Industry*" or write to EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

Chemical Description of Eastman Antiozonants

Eastozone 30 ..... N, N'-Di-2-octyl-p-phenylenediamine
Eastozone 31 ..... N, N'-Di-3-(5-methylheptyl)-p-phenylenediamine

Eastozone Eastman Rubber Antiozonants

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Massachusetts; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

Pureco "Dry-Ice" *or* Bulk Liquid CO_2

***will help you solve that* TOUGH DEFLASHING PROBLEM**

Many manufacturers are finding that rubber tumbling with Pureco CO_2 saves money and produces a smoothly deflashed product.

The best way to use "Dry-Ice" or bulk liquid CO_2 depends on numerous factors—the number and kind of parts to be deflashed, the type of tumbler equipment used and the established production set-up.

Your Pureco representative will be glad to talk over your problem and arrange a test run on parts you select. There is no obligation for this technical service—and you'll quickly see how deflashing with Pureco "Dry-Ice" or bulk liquid CO_2 can save you time, money, manpower, and material.

Contact your nearest Pure Carbonic office or write the address below.

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Pure Carbonic Company

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AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

Fisk Flotofoam Mattresses

► U. S. Rubber Co., 1230 Ave. of the Americas, New York 20, N. Y., has introduced a new line of foam mattresses called "Fisk Flotofoam," which has what is said to be an entirely new construction. Produced on distinctive molds with one inch cores in the center and 1¼ inch cores at each end, the mattresses have smooth tops. This construction is said to permit production of quality durable foam mattresses at reasonable prices which will give greater support in the center and yet a luxurious feeling for sleeping. The mattresses are being produced in standard and firm densities with a minimum density of 19 pounds in twin, full, long twin and long full sizes. Fisk Flotofoam mattresses will be made in the company's Woonsocket, R. I., and Santa Ana, Calif., plants, while stocks will be maintained in the Mishawaka, Ind., plant.

Koroseal Industrial Conveyor Belt

► The first heavy industrial conveyor belt made with smooth, non-porous covers of "Koroseal" polyvinyl chloride has been announced by the B. F. Goodrich Industrial Products Co., Akron, Ohio. Koroseal covers are said to resist oils, grease, most acids and protect against abrasion, cutting and gouging. The new belt has been designed especially for use in metal-working plants, chemical plants, assembly plants, pulp mills or the glass, plastic or textile industries—wherever resistance to cutting oils and greases and a smooth, non-marking cover is required. The belt is available in widths up to 48 inches, reinforced with from two to four plies of 42 ounce fabric.

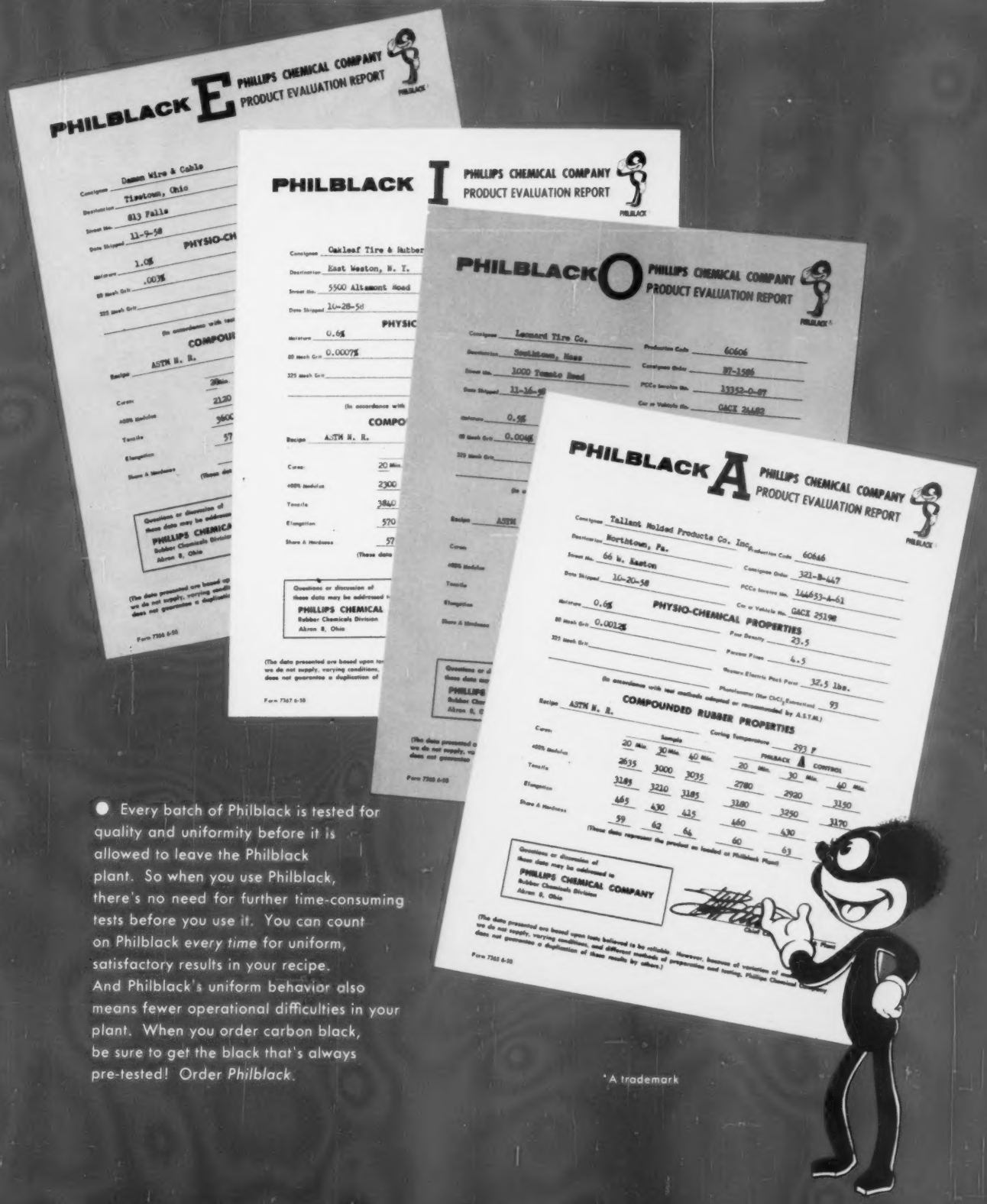
Bassick Caster Wheels

► Bassick Co., Bridgeport, Conn., has announced that two of the company's lines of casters now utilize new non-marking, stain-resistant caster wheels, which are said to give fifty per cent longer service than previous rubber wheels. Developed by Bassick and Firestone engineers, the wheels are equal to the black rubber wheels previously used and are made of the first non-marking rubber tread with the physical qualities considered essential for office chair and hospital casters. These wheels are now standard on the 1¾ and 2 inch diameter Bassick chair caster wheels and the 3, 4, and 5 inch diameter Baco hospital caster wheels.

Anti-Corrosive Acid Hose

► A new acid hose that is said to outlast conventional acid hose in highly corrosive service has been announced by the B. F. Goodrich Industrial Products Co., Akron, Ohio. Called "Commander," the new acid hose contains a special hose tube made of newly developed acid-resisting material. The tube withstands 96 per cent sulfuric acid at 70°F. as well as strong oxidizing acids and other chemicals.

CAREFUL PRE-TESTING ASSURES YOU THAT EVERY SHIPMENT OF PHILBLACK* MEETS SPECIFIED REQUIREMENTS!


PHILBLACK E
PHILLIPS CHEMICAL COMPANY
PRODUCT EVALUATION REPORT
PHILBLACK I
PHILLIPS CHEMICAL COMPANY
PRODUCT EVALUATION REPORT
PHILBLACK O
PHILLIPS CHEMICAL COMPANY
PRODUCT EVALUATION REPORT
PHILBLACK A
PHILLIPS CHEMICAL COMPANY
PRODUCT EVALUATION REPORT
Consignee Tallant Molded Products Co. Inc.
Destination Norristown, Pa.
Street No. 66 W. Easton
Date Shipped 10-20-58
Production Code 60646
Consignee Order 321-B-447
PCCo Invoice No. 144653-A-61
Car or Vehicle No. GACX 25198
PHYSIO-CHEMICAL PROPERTIES
Moisture 0.6%
80 Mesh Grit 0.001%
325 Mesh Grit
Pour Density 23.5
Process Flow 4.5
Western Electric Pack Factor 32.5 lbs.
Photometer (for CHCl3 Extraction) 93
(In accordance with test methods adopted or recommended by A.S.T.M.)
COMPOUNDED RUBBER PROPERTIES
Recipe ASTM N. R.
Cure: Sample
Curing Temperature 293 F
PHILBLACK A CONTROL
20 Min. 30 Min. 40 Min.
20 Min. 30 Min. 40 Min.
300% Modulus 2635 3000 3035
Tensile 3185 3210 3185
Elongation 665 630 635
Shore A Hardness 59 62 64
2780 2920 3150
3180 3250 3370
660 630
60 63
(These data represent the product as loaded at Philblack Plant)
Questions or discussion of these data may be addressed to
PHILLIPS CHEMICAL COMPANY
Rubber Chemicals Division
Akron 8, Ohio
(The data presented are based upon tests believed to be reliable. However, because of variation of materials, we do not supply, varying conditions, and different methods of preparation and testing, Phillips Chemical Company does not guarantee a duplication of these results by others.)
Form 7365 6-58

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E **Philblack E, Super Abrasion Furnace Black.** Toughest black yet! Extreme resistance to abrasion.

PHILLIPS CHEMICAL COMPANY, Rubber Chemicals Division, 318 Water St., Akron 8, Ohio. District Offices: Chicago, Providence and Trenton. West Coast: Harwick Standard Chemical Company, Los Angeles, California. Warehouse stocks at above points and Toronto, Canada. Export Sales: 80 Broadway, New York 5, New York. European Sales Office: Phillips Chemical Company, Limmatquai 70, Zurich 1, Switzerland.

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Para Resin 2457

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Para Resin 2457 is a dark-colored petroleum base resin with a softening point between 200 and 220° F. It lends itself to good dispersion, improves the flow of extrusion stocks and gives smooth calendered stocks. Because of low specific gravity and volume cost, it is an economical compounding ingredient for mechanical goods. You can increase your profit and improve the quality of your mechanical goods by incorporating 2457 in your compounds. CALL HALL for service on Para Resin and all your other chemical needs! If you run short—if you want service in a hurry—the C. P. Hall Company is as near as your telephone. Call the office nearest you—ANY time.

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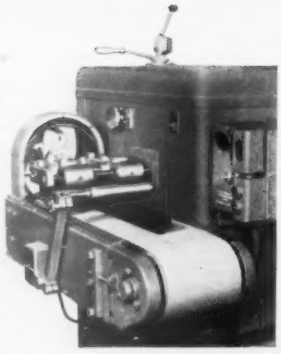
Tried-and-proven clutch designed and built by Motch & Merryweather for use on Wink cutters. Shown is Model M-420-C. Other models and special applications to fit individual requirements.



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WINK cuts any extruded material, speeds being controlled automatically to equal extruding speeds; 3000 pieces per minute are possible. Right off the belt, WINK cuts lengths of 100 feet and more from 3" dia. down to thin 1/16" slices on 1/2" dia. stock; *no distortion or collapse.* Set-up time negligible; short runs practical. Waste reduced up to 90%.

Write for Bulletin "G-1".

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AVAILABLE IN SOFT, MEDIUM OR HARD GRADES

000 MULTICEL
FILLER FOR LIGHT WEIGHT GOODS

MAGNESIUM CARBONATE
A RE-INFORCING PIGMENT

◆

TAMMS INDUSTRIES CO.
RM-22—228 N. LA SALLE ST., CHICAGO 1, ILL.

U. S. Rubber Life Raft

► A rubber life raft, said to inflate itself and its special boarding platform within 30 seconds has been introduced by the U. S. Rubber Co., 1230 Ave. of the Americas, New York, N. Y. The first to be produced by the company for commercial use, the raft carries ten passengers and folds into a carrying case measuring three feet long, 18 inches wide and 15 inches high.

When the case is tossed into the water, a tug on the single lanyard starts inflation.

Open, the raft has a bright yellow canopy for visibility and protection against exposure, and affords 45 feet of space for passengers and emergency equipment. Packed with standard equipment, it weighs 130 pounds. Emergency equipment includes a hand pump, paddles, a floating knife, sea anchor, several lines, a signal mirror and a rain catcher. Additional survival gear can be stored in a special equipment container. The raft is made of neoprene coated nylon fabric to resist deterioration and is inflated with CO_2 gas. The floor, inflated manually, provides rigidity and insulation from cold sea water, the company states. A slightly smaller raft, suitable for six passengers, will also be produced.

Red-Hed Golf Club Protectors

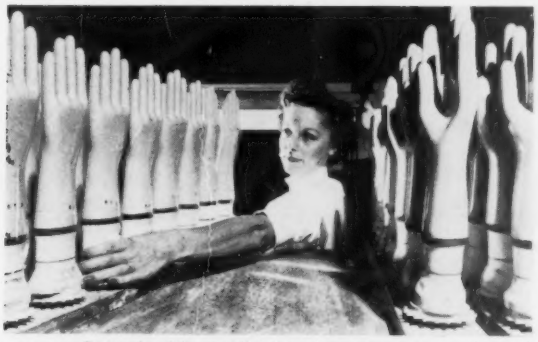
► Red-Hed Division of Taylor Electric Co., Detroit, Mich., has introduced a new golfing accessory, consisting of rigid plastic tubes that separate and protect each club in the golfer's bag. Called the "Red-Hed", the 33½-inch long tubes can be used with any type of golf bag. Every club lifts out easily and quickly without scuffing or causing wear that leads to costly replacement of grips. Each Red-Hed tube is snapped into position in a rigid vinyl template made in various sizes and shapes to fit the tops of all standard golf bags. Made of high-impact Geon rigid vinyl, the tubes will not break, crack, or chip, and are unaffected by rain, the company states.

New Packaging and Loading Technique for MBTS

► Handling costs are lowered and storage space requirements reduced by as much as 20% with the vacuum packaging technique now used by American Cyanamid for its popular rubber chemical, MBTS. This technique not only insures neat full bags, but also permits easier handling and less risk of tearing. As an added convenience to customers, 50-lb. bags of MBTS are palletized by Cyanamid in compact unit loads of 2000 lbs., each load requiring only 17½ sq. ft. of storage space. If you are bothered by storage problems or increasing handling costs, investigate the savings made possible by unit loading of MBTS and other rubber chemicals.

A Premium Product for Compounding Economy

► Antioxidant 2246® is generally recognized as the most active non-staining antioxidant available today for white or light-colored rubber goods. Often overlooked, however, is the inherent economy of this premium product. In cases where the extra protection afforded by full



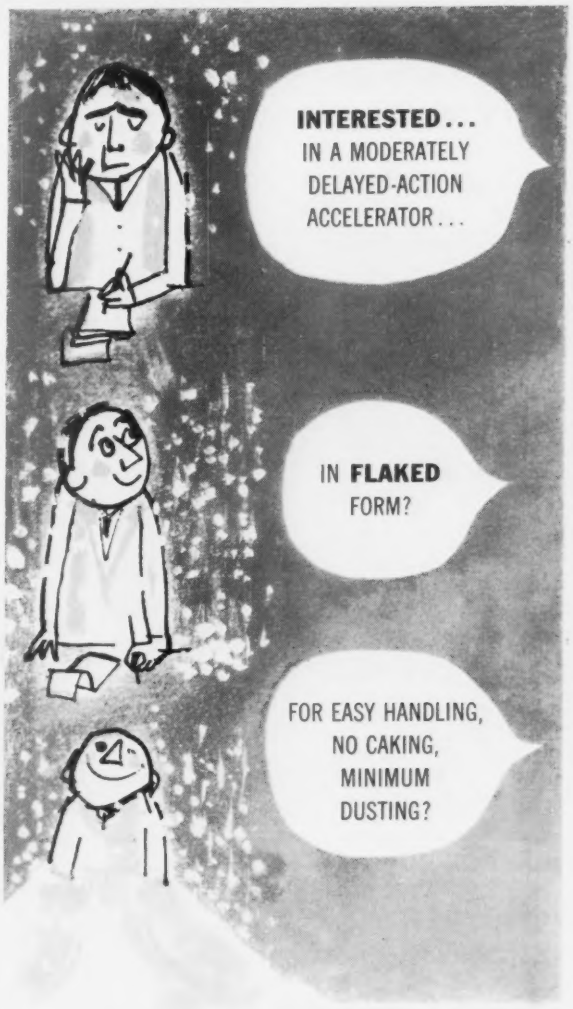
dosages of Antioxidant 2246 is less important than the compound cost, one third the amount of Antioxidant 2246 will give better aging characteristics and lower cost than full dosages of cheaper antioxidants. Cost-conscious compounders can economize and benefit from the extra activity of Antioxidant 2246 by using it on a price basis rather than a part-for-part basis.

From A to Z in Delaying Action

► With the recent introduction of CYDAC Accelerator Flaked, a delayed action accelerator in the medium activity range, Cyanamid can now provide accelerators ranging from the very fast guanidines to DIBS® Accelerator possessing the greatest delayed action known.

Apart from the wide range of delaying action, this complete line of accelerators provides many other advantages. For example, all are processed and tested under the same controlled conditions, insuring highest quality. There is also dependability of supply. Cyanamid rubber chemicals are manufactured from basic raw materials in one of the country's largest chemical plants. Strategically located warehouses assure fast delivery.

Mixed shipments at quantity price add to the other economies of more compact storage, easier handling and reduced inventories when American Cyanamid Company fills your accelerator requirements.



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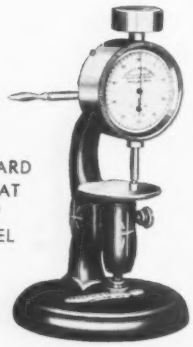

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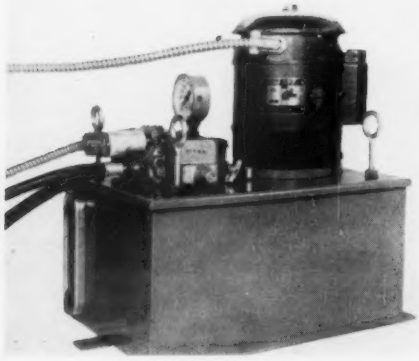

include application to hot stretch process lines in nylon tire fabric manufacturing, bias cutting of wire-woven nylon or rayon tire fabrics, and in calendering operations of tire tread stock. Easy installation and maintenance are claimed for the system because of its basic simplicity. Since it uses only electrical wiring and flexible hose, it can be quickly shifted from one production line to another. The absence of rigid piping simplifies position changes to any machine. The system consists of three units, shown in the illustration: (1) a sensing head with two photoelectric cells (upper left); (2) a control device which amplifies the signals and controls the actuating mechanism (upper right); and (3) a correction unit which uses either a hydraulic cylinder or an electric motor as actuating mechanism (bottom). The system is said to work equally well whether the web is fast or slow moving.

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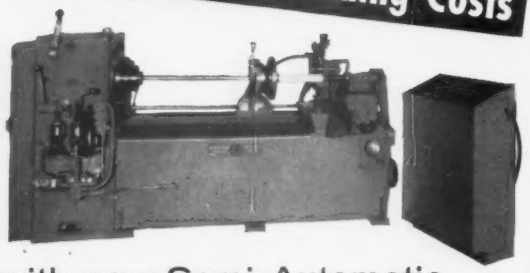

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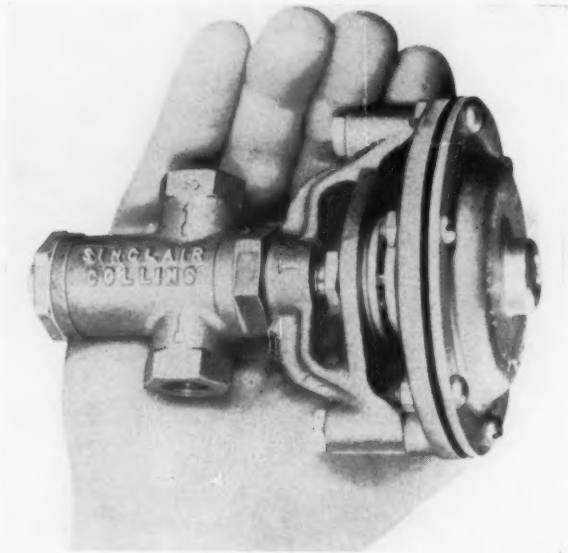
Sinclair-Collins Diaphragm Valve

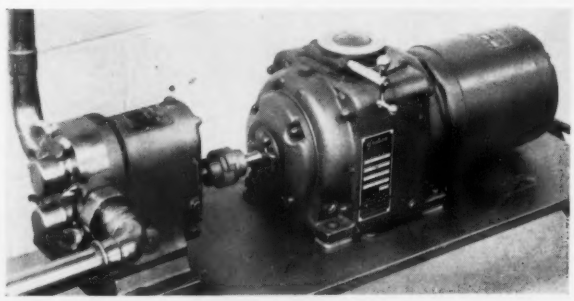
► A ¼-inch NPT 125 psi 3-way NC valve, especially designed for steam, hot and cold water, and air and gas service, has been announced by Sinclair-Collins Valve Co., 454 Morgan Ave., Akron 11, Ohio. The diaphragm-



operated valve is said to offer compact design for simplified installation, leak-free performance, low initial cost and minimum maintenance. Body, yoke, ring and piston are cast Navy M bronze, with cast iron body optional. Disc holders and gland nuts are bar brass, the stem is stainless steel and the spring is chrome silicon steel. Adjustable stem packers and special composition seats are said to assure leak-free operation in the specified service.

Waukesha Sanitary Metering Pump

► A new line of sanitary metering pumps suitable for handling latex is said to provide high accuracy metering with discharge rates from 25 gpm to zero. The pumps,



recently announced by Waukesha Foundry Co., Waukesha, Wisc., are supplied in either stainless steel or nickel alloy. The infinite range type provides a micrometer adjustment said to permit extremely accurate rate

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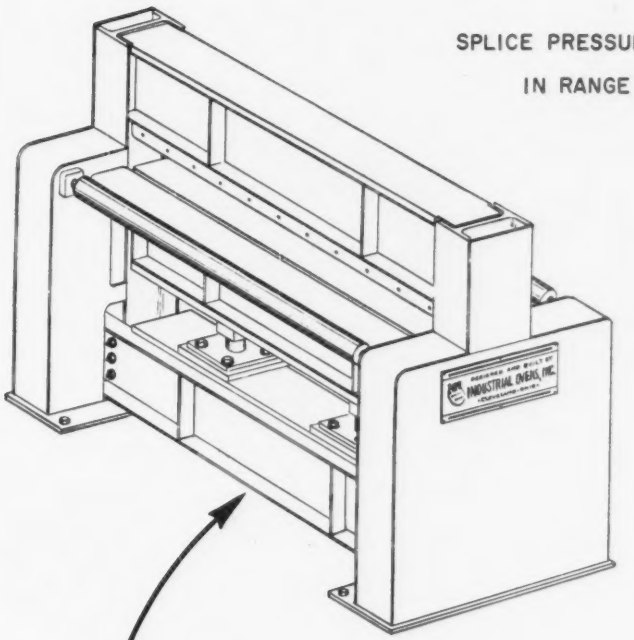

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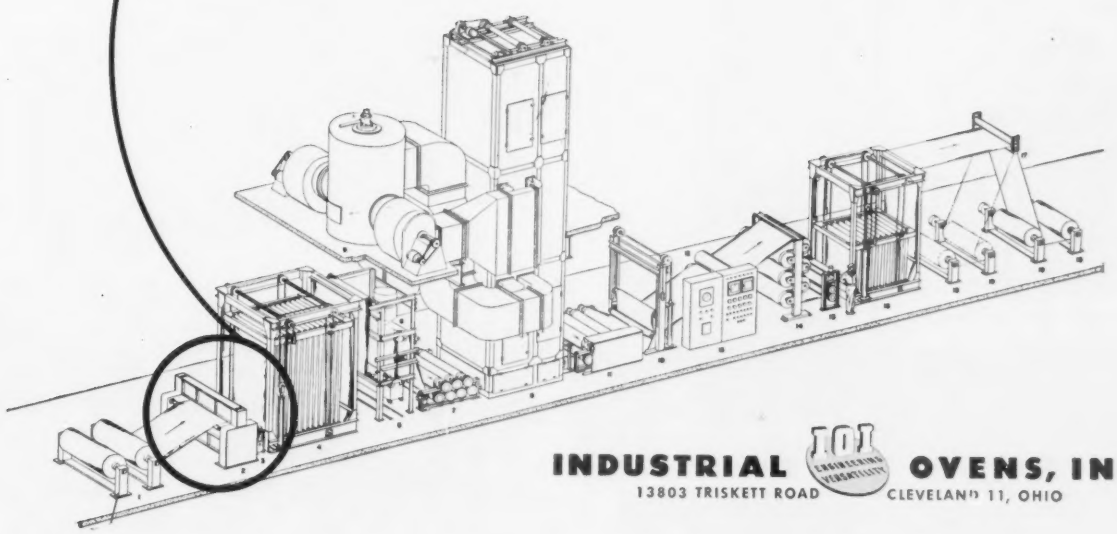

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settings. Once set, the discharge rate remains constant to provide high accuracy metering and proportioning. Other controls, pneumatic or electric, are offered for remote or automatic control of flow rate. A unique feature of the pumps is a one-piece shaft extending through both a spur gear and a pump chamber with no bushings or bearings in the pump chamber and no metal-to-metal contact of the metering impellers. In addition to light, non-viscous liquids, the pumps are designed to handle heavy viscous materials without aeration, crystallization or product break-down. A portable type designed for convenient movement from one job to another and for quick cleaning is shown; other types for permanent installation are available.

► The Speedry Magic Marker Stenciling Set, a **stenciling device** suitable for use on tires and other rubber products, is produced by Speedry Products, Box 97, Richmond Hill, Jamaica 18, N. Y. The ink supplied with the set is quick drying, permanent and said to take to almost any surface.

► The Little Joe Sleeving Cutter is a **compact, bench-type tool** which cuts all types of insulation tubing in lengths ranging from 1/32-inch to 2 inches. The cuts are said to be razorlike, with no crushed pieces or spoilage. It is manufactured by Macdonald & Co., 1324 Ethel St., Glendale 7, Calif.

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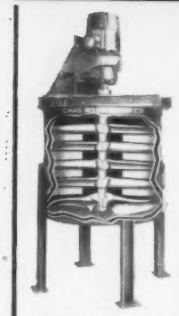
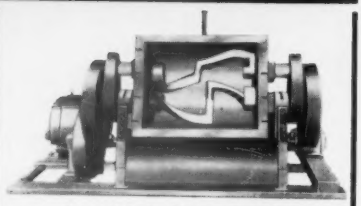

Rubber Cement Mixers
100 - 1000 Gal. sizes


Heavy Duty Double Arm Kneaders
1 pint - 150 Gal. sizes

Rubber Reclaiming Mixers
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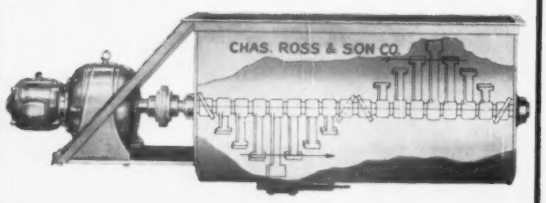
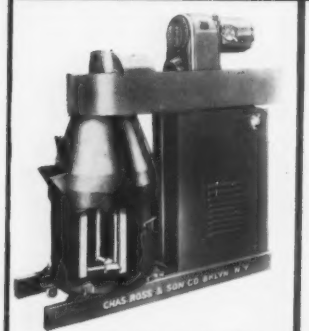
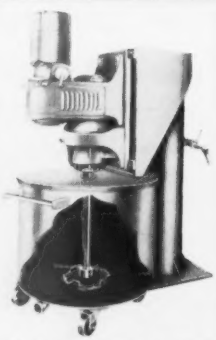



Double Planetary Change Can Mixers
1 - 150 Gal. sizes


High Speed Change Tank-Mixers
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Heavy Duty Paste Mixers
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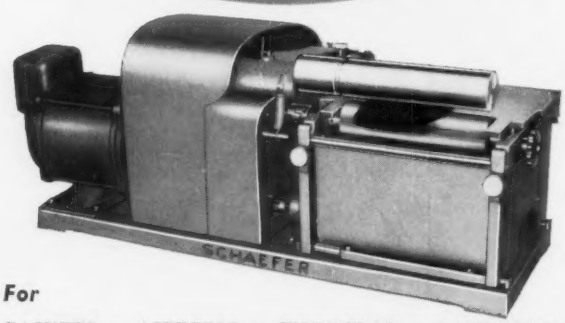

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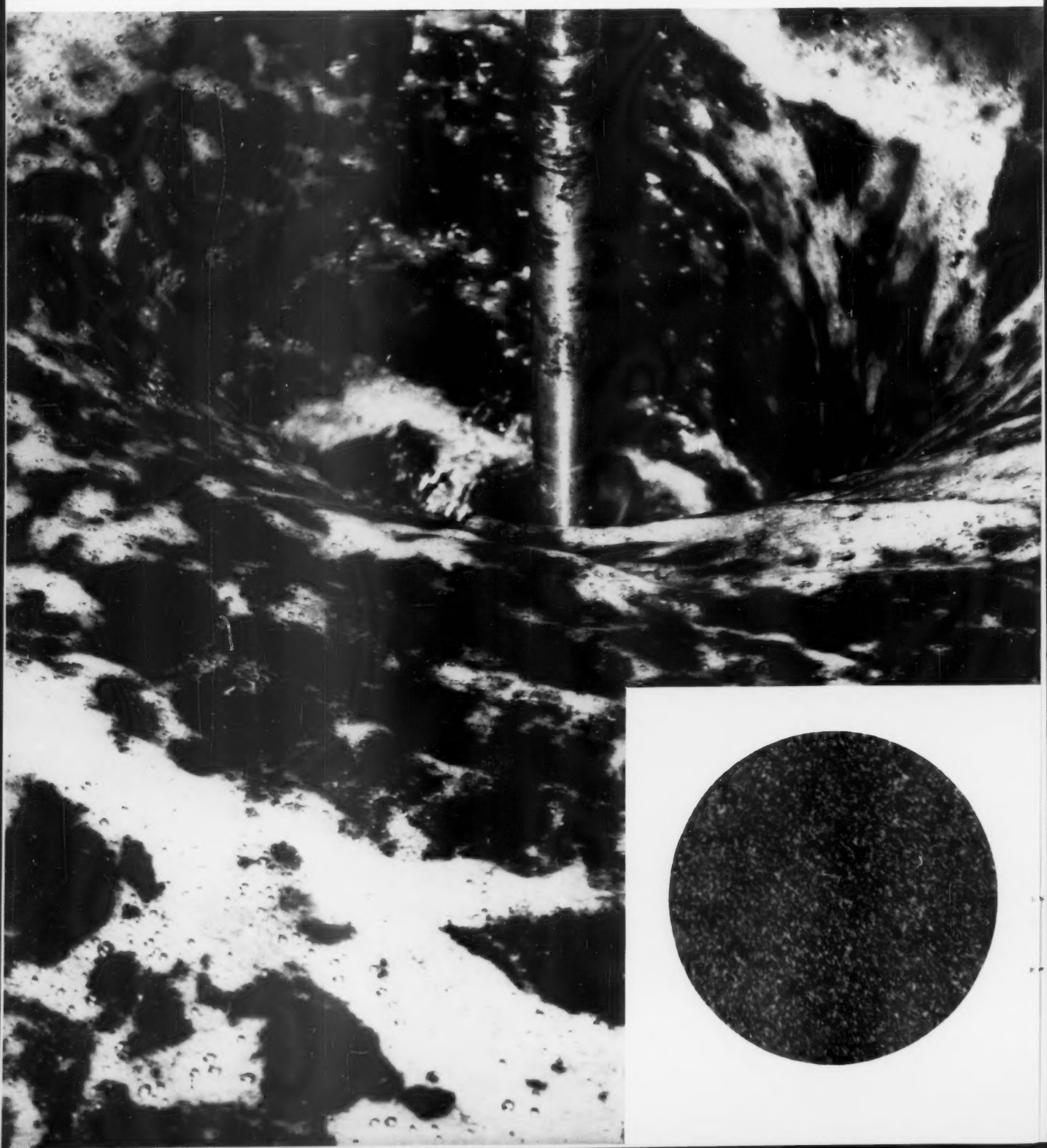

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If you wish, we will have a Goodrich-Gulf engineer give you any help you need. Call HEnderson 2-1000 in Cleveland, Ohio. Ask for J. E. Miller, Vice-President in Charge of Sales. Call him now or mail coupon. When ordering, please specify the type of Micro-Black you desire—Ameripol 4650 (55 part H.A.F. black), or Ameripol 4651 (62½ part H.A.F. black).

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Photomicrograph 200X

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This check list shows how you can improve your operation with
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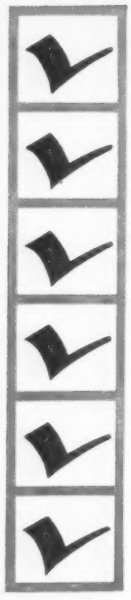

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2 *Get your test ton of Ameripol Micro-Black*—and let it prove itself in the exclusive Goodrich-Gulf Try-a-Ton Test. Write, wire, phone or use the coupon on preceding page.

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Reviews

BOOKS

Methoden der Organischen Chemie 'Houben-Weyl' (Methods of Organic Chemistry). (Fourth Edition). Edited by Eugene Müller in cooperation with O. Bayer, H. Meerwein and K. Ziegler. Published by Georg Thieme, Stuttgart, Germany. 20 volumes; average price $25.00 per volume; 7½ x 10½ in. (in German).

(EDITOR'S NOTE: An over-all review of 'Houben-Weyl' appeared in the March, 1957 issue of RUBBER AGE. Reviews of Volumes II, III Part 1, and VIII appeared in April, 1957; of Volumes III Part 2, IV Part 2, VII Part 1, and IX in May, 1957; and of Volume XI Part 1 in January, 1958. Below is the review of the latest volume in the set. Additional reviews will appear in these columns as the volumes appear in print.)

Volume I, Part 1. 'Allgemeine Laboratoriumspraxis I'. By W. R. Aehnelt (Laboratorium für Adsorptionstechnik, Frankfurt/Main), O. Bayer, R. Erdmenger, O. Jübermann, M. Quaedvlieg, P. Schneider, H. Schwarz, K. Sigwart, E. Tietze, and H. Weissbach (Farbenfabriken Bayer AG., Leverkusen), K. Bratzler (Bad Homburg v. d. H.), F. Cramer (Universität Heidelberg), W. Grassmann and K. Hannig (Max-Planck-Institut, München), R. Griessbach (Wolfen), G. Hesse (Universität Erlangen), R. Jaeckel (Universität Bonn), F. Kneule (Technische Hochschule, München), L. Kratz and K. Rehm (Jenaer Glaswerk Schott and Gen., Mainz), A. Lüttringhaus (Universität Freiburg i. Brsg.), G. Maneck (Fritz-Haber-Institut, Berlin), G. Naumann (Leipzig), W. Schlenk Jr. (Badische Anilinund Sodafabrik AG., Ludwigshafen/Rhein), H. E. Schultze (Behringwerke AG., Marburg/Lahn), R. Schwarz (Technischen Hochschule, Aachen), and E. J. T. Wiedemann (Sandoz AG, Basel). 1048 pp. DM 198.

As with some of the previous volumes, the editors found the subject matter to be more than could be covered in one book. Volume I, Part 2, the editors promise, will cover, among other subjects, vacuum and pressure techniques, size reduction and special laboratory methods, such as working with explosives and micromethods. Gas chromatography will be treated in due time in a supplementary volume. The editors give as their reason for this decision that chromatography of gases is at the present centered on analytical procedures and should therefore not be included in a handbook of preparative methods.

Volume I, part 1, is divided into two main sections, 'Materialkunde' and 'Methoden zur Stofftrennung'. The first of these two sections is a concise (125 pages) presentation of basic properties of materials used for laboratory equipment. Putties and cements are discussed as well as glass types, ceramics, metals and plastics used in laboratory ware. The second section, which deals with general methods of mechanical and chemical separation of mixtures, is subdivided under the following headings: decantation, filtration and ultrafiltration; washing, clarifying and decolorizing; expressing; breaking of emulsions; distribution and extraction; crystallization; preparation and use of occlusion compounds (literal translation of term coined by the author of this section, meaning selective sorption by molecular sieves and formation of adducts); isolation of substances by formation of complex and double compounds; salting out; absorption in the liquid stage; absorption from the gaseous phase; ion exchange; Redox resins; centrifuging; dialysis and electrodialysis; preparative electrophoresis; drying of solid substances; distillation and rectification; concentration by evaporation; and distillation and sublimation in high vacuum. Two pages devoted to hints regarding designing and equipping an organic chemical laboratory are essentially a bibliography of published literature on the subject of laboratory design. The author index occupies 37 pages, the subject index 51.

Volume I, Part 1, is again an outstanding encyclopedic presentation of the subject matter covered. Theory and practice are

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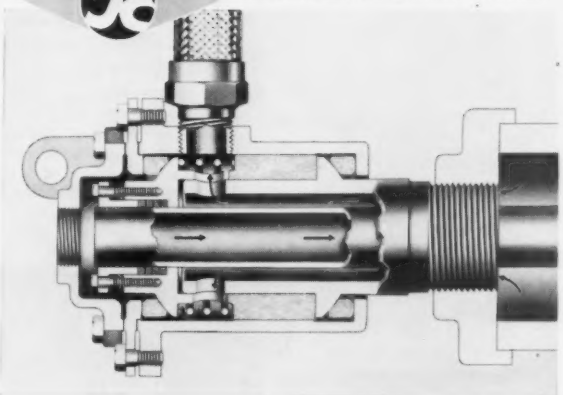

both well treated, giving preparative organic chemists the opportunity to find in one place most of the information sought on special laboratory techniques. All readers will appreciate the theoretical discussions opening each chapter. Literature references are given for those who want more information. The authors of some of the chapters, such as the one on extraction, went even a little bit overboard on theory at the expense of practical examples. Some users of 'Houben-Weyl' would most likely prefer to see more information on the 'how' than the 'why', which can be found in specialized textbooks and original articles. This criticism is not a serious one. The volume is a valuable tool for preparative chemists. This reviewer mentioned in the over-all review which appeared in the March, 1957 issue of this magazine that he was anxiously awaiting the appearance of Volume I of the set. It can now be stated that the reviewer has not been disappointed in his expectations. F. R.

•

Progress in Plastics: 1957. Edited by Phillip Morgan. Published by Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y. 6¼ x 10 in. 394 pp. $22.50.

This book contains the papers given at the British Plastics Convention held in conjunction with the British Plastics Exhibition at Olympia, London, in July, 1957. Their presentation represents an international survey of developments in many aspects of plastics technology. The authors are from the United Kingdom, United States and Germany. The discussions which followed the presentations of the papers are reproduced in full.

The 18 papers given at the meeting were on the following subjects: Polyolefins, Polyethylene, Polyvinyl Chloride, Extrusions, Injection Molding, Material Developments and Glass-Reinforced Plastics. Those of particular interest to the rubber industry include "Foamed Polyvinyl Chloride," by D. A. Lever and G. Burke, and "Recent Developments in Fluorine Polymers," by G. W. Bowley. As would be expected, the quality is high, and the authors have dealt with their subjects succinctly and clearly.

The editor is to be commended for including in full the discussion periods which followed the papers. The questions asked are indicative of the centers of interest and types of problems pertinent to the plastics field today. The international character of the conference makes this information all the more valuable.

•

Plant Engineering Practice. Published by F. W. Dodge Corp., 119 W. 40th St., New York, N. Y., in cooperation with the Technical Publishing Co. 8½ x 11½ in. 694 pp. $18.50.

This book is a compilation of selected articles published by *Plant Engineering* magazine in recent years. They have been selected on the basis of quality and on their common denominator of interest for all plant engineers, no matter what their industries. The authors themselves are plant engineers, consultants and other specialists in their respective subjects. Together they provide a practical sourcebook of plant operation and maintenance.

The volume is organized into 13 extensive sections: Sites and Layout; Construction; Housekeeping and Safety; Materials Handling; Maintenance; Paints and Protective Coatings; Mechanical Power and Piping Systems; Electric Power; Lighting; Utilities; Heating, Ventilating and Air Conditioning; Instrumentation and Quality Control, and Shopwork. Within these sections are 226 detailed studies which include over 800 illustrations.

This book is one which will find application for a number of years. Not theoretical and not a textbook, it offers a wide variety of information which is both practical and up-to-date. As would be expected, the editors have made use of their journalistic knowledge to present this information legibly and attractively.

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From Rubber to Rockets. (2nd Edition). Thiokol Chemical Corp., Trenton, N. J. 5 x 7 in. 32 pp.

This informative little booklet is divided into two parts: "Developments of Synthetic Rubber" and "Breakthrough in Rocketry." The first deals with the evolution of synthetic polymers, with particular emphasis on the Thiokol rubbers and their end uses. The second part describes the history, development and operation of rockets. Basic rocket theory is explained, and a schematic diagram used to portray exactly what happens, how and why. The last pages are devoted to Thiokol's rocket research personnel, and to company activities and organization. An intriguing subject is presented simply and clearly.

•

Skim Rubber. (Research Memorandum No. R-410). By R. C. W. Moakes, S. H. Morrell and J. R. Pyne. Research Association of British Rubber Manufacturers, Shawbury, Shrewsbury, Shropshire, England. 6 x 9¾ in. 12 pp. 5s.

Due to the steadily growing production of concentrated latex on the plantations, skim rubber, made by coagulating the by-product "skim" latex, is coming onto the market in increasing quantities. Of necessity from its mode of production, it has an unusually high content of non-rubber substances such as proteins, and hence is liable to behave abnormally and give trouble in manufacturing processes. As a result of discussions initiated by tire manufacturers, the Research Association of British Rubber Manufacturers made a study of the properties of skim rubber and the best ways of using it. These investigations included samples made by special processes designed to reduce the non-rubber content.

This work showed in particular that correct choice of accelerator does much to reduce the scorching tendencies of skim rubber, and that the special processes used in preparing certain of the samples gave them much more nearly normal scorch and cure characteristics. It was further found that blending with styrene rubber provides a useful alternative method of using skim rubber; blends gave good results in resin-rubber shoe soling compounds, for instance. This and other useful information concerning skim rubber is presented in this report.

•

Professional Cutlery. Russell Harrington Cutlery Co., Southbridge, Mass. 8½ x 11 in. 74 pp.

This catalog, divided into two parts on professional and industrial cutlery, carries an extensive section on knives used in the rubber industry and for tire repair. Twenty-four blades, knives and trimmers for use with rubber are depicted by photographs, each with its application indicated. The dimensions in which each is available are given, and details of construction, material and blade design are included. Eight knives of various designs for use in tire repair are also catalogued, with similar information provided for each.

•

Products, Profits and Plioflex. Goodyear Tire & Rubber Co., Akron, Ohio. 8½ x 11 in. 36 pp.

The purpose of this manual is to explain Plioflex rubber—what it is, how it came into being, how it is made, and how it is used. It is divided into sections on history of synthetics, the process by which Plioflex is made, basic polymer types and end uses. Subsidiary sections are devoted to other Goodyear materials for the rubber industry, and to services performed by the company. A data sheet of physical properties of the Plioflex rubbers is included with the booklet. The content is high in quality, as are the design and execution.

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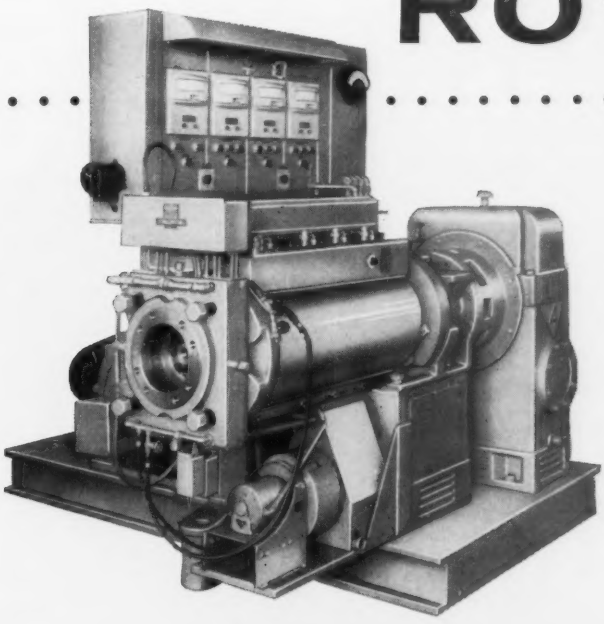

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (August 1), the price of spot rubber on the New York Commodity Exchange has moved in a range of 88 points, high for the period being 29.13c reached on August 25 and on three other days during the period, and low being 28.25c reached on August 1. The average price of spot rubber for the month of August was 28.72c based on 21 trading days. This compares with an average of 27.70c in the previous month.

Analysts at Merrill Lynch, Pierce, Fenner & Smith point out that the rubber market remains in an uptrend with prices about 3c higher than they were three months ago. Total open interest, however, still has not built up to any appreciable extent indicating that the speculative interest has not developed.

Although it appears that the economic outlook is improving, buyers are still not in any rush to follow price advances. The persistence of "fill-in" buying and lack of Communist bloc purchases does not inspire initiative. It is probable that sentiment is as favorable to prices at 28c a pound as it was when they were at 25c a pound.

Situation Favorable to Synthetic

The 3c advance in natural rubber prices and the trouble-laden Middle East make proportionately greater European consumption of synthetic rubber more attractive. With the European economy showing signs of tapering off, the price structure will become a greater consideration and may tend to limit purchases.

The Rubber Growers' Association now looks for 1958 production of natural to be 1,920,000 tons and consumption 1,915,000 tons. This would leave a calendar year surplus of only 5,000 tons. However, there well could be room for a 50,000 ton deficit rather than a 5,000 surplus. Estimates of consumption in the Communist bloc normally tend to be conservative.

If a deficit situation becomes apparent in the latter part of 1958, the price structure may move upward. If domestic stocks of natural start to go down because of brisk production of 1959 cars, prices may react upwards. Another factor which may tend to raise natural rubber prices is the situation at Formosa. All these elements may combine to move natural rubber to still higher levels.

Synthetic Price Effects

There are rumors afoot that the price of general purpose synthetic rubber may be in for a slight increase. There is, at least, a sentiment in this direction. Were this to occur and were the price increase be in the neighborhood of one-half cent a pound, there might be reaction on the part of natural consumption.

There is presently a 2 to 3 cent differential between general purpose synthetic and a comparable grade of R.S.S. A one-half cent increase in the price of synthetic would still leave a considerable margin between the two. However, the psychological impact of a synthetic price increase might temporarily force a turn to natural.

NEW YORK, SEPTEMBER 2, 1958

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM AUGUST 1 TO AUGUST 31

Aug.	Spot	Sept.	Nov.	Jan.	Mar.	Sales
1	28.25	28.04	28.00	27.90	27.90	74
2	....	....	....	....	....	...
3	....	....	....	....	....	...
4	28.38	28.10	28.06	27.96	27.95	11
5	28.50	28.47	28.25	28.15	28.10	34
6	28.50	28.20	28.10	28.00	27.95	27
7	28.38	28.10	28.05	28.00	27.95	34
8	28.50	28.25	28.20	28.11	28.05	37
9	....	....	....	....	....	...
10	....	....	....	....	....	...
11	28.63	28.40	28.30	28.20	28.15	5
12	28.75	28.60	28.45	28.35	28.25	42
13	28.75	28.40	28.25	28.15	28.15	16
14	28.88	28.80	28.50	28.35	28.25	27
15	28.63	28.45	28.25	28.15	28.15	29
16	....	....	....	....	....	...
17	....	....	....	....	....	...
18	28.50	28.30	28.08	28.01	28.00	28
19	28.50	28.30	28.15	28.10	28.08	28
20	28.75	28.65	28.40	28.30	28.15	29
21	29.00	28.99	28.65	28.48	28.47	51
22	28.88	28.80	28.55	28.40	28.26	25
23	....	....	....	....	....	...
24	....	....	....	....	....	...
25	29.13	28.88	28.65	28.46	28.42	14
26	28.88	28.60	28.40	28.25	28.15	33
27	29.13	28.85	28.65	28.45	28.35	24
28	29.13	29.00	28.75	28.60	28.40	33
29	29.13	29.15	28.85	28.65	28.45	28
30	....	....	....	....	....	...
31	....	....	....	....	....	...

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.29⅛
Oct.	.29
Nov.	.28⅞
Thin Latex Crepe:	
Spot	.31½
Thin Brown Crepe, No. 2	.23⅛
Flat Bark Crepe	.19⅝

London Market
(Standard Smoked Sheets)

Oct.-Dec.	28.30—28.44
Jan.-Mar.	28.44—28.59

Singapore Market
(Standard Smoked Sheets)

Oct.	26.96—27.04

Middling Upland Quotations

	Aug. 1	September 2		
	Close	High	Low	Close
Oct.	36.32	35.39	35.27	35.30
Dec.	36.65	35.76	35.66	35.70
Mar.	36.90	36.15	36.01	36.02

Notes & Quotes

John N. Hart, controller of the B. F. Goodrich Co., notes that the urgent need for adequate profits is the number one problem in the American economy. Without adequate profits, he said, industry will be unable to provide the new products and services on which the future expansion of our economy depends. He pointed out that Goodrich rubber production and maintenance workers average $3.43 an hour in wages and employee benefits. Rubber production workers doing the same quality and quantity of work in Germany and Holland earn about 75 to 80 cents an hour. If the present wage inflation continues in this country, he said, American firms will need plants abroad to make goods cheap enough to sell in our domestic markets.

Synthetic Rubber

According to the Rubber Manufacturers Association, a total of 469,983 long tons of all types of synthetic rubber were consumed in the first seven months of this year. This amounted to a synthetic preference ratio of 64.16 per cent, as against a ratio of 62.75 per cent in the first seven months of the preceding year.

A total of 469,932 long tons of S-type rubber were produced in the United States in the first seven months of this year against the 495,381 long tons produced in the first seven months of 1957. However, in the seven month period in 1958, 390,989 long tons of S-type rubber were consumed, while in the comparable period of 1957, 446,218 long tons were consumed. Exports of S-type fell in the first seven months of this year when 87,853 long tons were sent abroad. In the first seven months of 1957, 92,209 long tons were exported.

Neoprene Production Down

The RMA figures show that in the first seven months of this year a total of 53,596 long tons of neoprene were produced, contrasted with the 62,873 long tons produced in the first seven months of the previous year. A total of 34,867 long tons of neoprene were consumed in the seven-month period of 1958, while 44,937 long tons were consumed in the comparable period of 1957.

Butyl rubber also showed a decline in production in the first seven months of this year; 30,253 long tons against 36,715 long tons in the first seven months of 1957. A total of 23,005 long tons of butyl rubber were consumed in the seven-month period of 1958 against the 32,440 long tons consumed in the first seven months of 1957.

N-type production in the first seven months of the current year amounted to 15,634 long tons, against the 19,036 long tons produced in the comparable period of the preceding year. RMA figures show that 11,977 long tons of N-type rubber were consumed in the first seven months of this year, while in the first seven months of last year, 15,275 long tons of N-type were consumed.

Synthetic Stocks High

Stocks for all types of synthetic rubber remain relatively high. As of July 31, 1958, there were 133,351 long tons of S-type rubber on hand, while at the end of July 31, 1957, there were 113,143 long tons of S-type rubber on hand, the Rubber Manufacturers Association reports.

It now appears as if 980,000 long tons of synthetic rubber of all types will be produced this year and that approximately 780,000 long tons will be consumed. It also appears as if something in excess of 200,000 long tons of synthetic rubber will be exported this year.

The synthetic preference ratio, to date, indicates an ever-increasing margin in favor of this type of rubber. Coupled with the rising preference for synthetic abroad, the next few years should be happy ones for the synthetic industry as well as for the basic suppliers of butadiene and styrene.

MARKETS

(continued)

Reclaimed Rubber

The trade reports that reclaimed rubber consumption has been fairly steady during the summer months. It is indicated that producers of replacement tires are becoming more aware of the advantages obtained in using reclaim in undertread and sidewall portions as well as carcass frictioning compounds.

The Rubber Manufacturers Association reports that in the first seven months of this year a total of 137,588 long tons of reclaimed rubber were produced in the United States. In the first seven months of the previous year, 164,081 long tons of reclaim were produced. A total of 128,118 long tons of reclaim were consumed in the United States in the first seven months of the current year while 159,149 long tons were consumed in the first seven months of 1957.

The expectations now are that approximately 240,000 long tons of reclaim will be produced in 1958 and that about 220,000 long tons will be consumed. It will be remembered that in 1957, 271,647 long tons were produced and 267,352 long tons consumed.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Moderate activity in the scrap rubber market has been observed during the past few weeks. New developments, however, are lacking, and shipments indicate that the market is listless. According to the Rubber Manufacturers Association, 121,441 long tons of scrap rubber were consumed in the first seven months of the current year.

On the basis of figures available to date it seems fair to assume that a total of 220,000 long tons of scrap rubber will be consumed in 1958. Stocks, however, at 53,270 long tons at the end of July, are high, and this may slow scrap collection through the balance of this year.

Some in the trade express the feeling that activity will be heightened through the balance of this year in consideration of new car production. There seems little likelihood that prices will show any significant increase by year end.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.04¼
No. 1 peelings	ton	28.00
No. 2 peelings	ton	25.00
No. 3 peelings	ton	18.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	19.00
Passenger S.A.G.	ton	17.00
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.06¾
Butyl Rubber Tubes	lb.	.04¼

Tire Fabrics

The Textile Economics Bureau reports that first quarter 1958 production of tire cord and fabric (excluding chafer fabric) aggregated 83 million pounds, a decline of 10 per cent from the 92 million pounds produced in the fourth quarter of 1957 and 26 per cent less than the 112 million pounds produced in the first quarter of 1957.

The largest poundage decline from the fourth quarter occurred in the output of nylon tire cord, where production was off by 6 million pounds or 27½ per cent to the latest level of 16 million pounds. Woven rayon tire fabric and non-woven rayon cord were off 3½ per cent and 11 per cent, respectively, while there was no change in cotton cord output.

Chafer fabric output in the first quarter of 1958 totaled 10 million pounds, made up of 7 million pounds of cotton fabric and 3 million pounds of man-made fiber fabrics. The largest quarterly total compares with output of 9 million pounds in October-December, 1957, and 12 million pounds in the first quarter of 1957.

Wide Fabric Prices

In local markets, additional price advances on wide industrial fabrics have been announced by a number of mills in an attempt to get prices of these goods up to more profitable levels. Some weavers have hiked prices of the 59-inch, 1.85 yard drill one-half cent a yard or from 34½ to 35 cents.

This advance was followed by rises in other wide industrial fabrics, which like the wide drill are used for coating purposes. Price rises here ranged from one-half to as much as 1½ cents a yard, depending upon the fabric and the mill concerned.

As one producer explained it, the prices were advanced on certain cloths because like the wide drill fabric they have been selling actively and deliveries have become tighter. In other fabrics, the situation has not yet improved to the same extent. It was felt necessary, however, to adjust all prices upward to comparable levels.

The price rises announced are by no means universal or even uniform. The trade expects that this situation will "shake down" within the next few weeks and that most producers will find a fairly uniform level at which to transact sales.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.73
1650	lb.	.67
2200	lb.	.67½

Nylon Tire Cord

210	lb.	1.95
840	lb.	1.70

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.68
9.25 oz. (per square yard)	lb.	.66
11.65 oz. (per square yard)	lb.	.62
14.4 oz. (per square yard)	lb.	.71

Liquid Latex

Natural: According to figures made available by the Rubber Manufacturers Association, a total of 37,857 long tons of natural rubber latex were imported into the United States in the first seven months of the current year. By way of comparison, a total of 42,316 long tons of natural rubber latex were imported into the United States in the first seven monh of the preceding year.

RMA indicates that 36,268 long tons of natural latex were consumed in the United States in the first seven months of this year while in the first seven months of 1957, 41,525 long tons were consumed. As of July 31, 1958, there were 15,500 long tons of natural latex in stocks, contrasted with the 12,073 long tons on hand as of July 31, 1957.

Current indications are that some 62,000 long tons of natural latex will be imported this year against the 72,252 long tons imported last year. It also seems as if 60,000 long tons will be consumed, contrasted with the 75,009 long tons consumed in 1957.

Natural latex prices have risen slightly since our last report and a figure of 36c to 37c is being quoted at East Coast ports when purchases are in car load lots.

Synthetic: The Department of Commerce reports that in the first half of the current year, 26,793 long tons of S-type latex were produced in the United States compared with 37,988 long tons in the first half of 1957. In the first six months of this year, a total of 26,981 long tons of S-type were consumed while in the first six months of 1957, 34,514 long tons were consumed.

Consumption of neoprene latices has also fallen—4,210 long tons in the first half of 1958—4,981 in the first half of 1957. The same is true of N-type latices, with 4,720 long tons being consumed in 1958 against 5,215 in 1957.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in a range of 20 points since our last report (August 1), high for the period being 36.45c reached on August 1 and on two other days during the month, and low being 36.25c reached on August 28 and 29. The average price of middling uplands for the month of August was 36.36c based on 21 trading days. This compares wih an average of 36.51c in the previous month.

Cotton consumption is running behind last year according to the Census Bureau which reports that so far this year 7,983,360 bales have been consumed against the 8,728,201 bales consumed by the end of August, 1957. The trade reports that at the end of July the "free" stock in the United States was 3,471,764 bales compared with 1,406,401 bales last year.

New farm laws are expected to increase the price risks for merchants in the cotton business. This is indicated by the fact that the large spot firms are using the futures market for hedging purposes to a greater extent than for several years. In 1959 the support program will be different in that the government will purchase cotton but will also sell cotton 10 per cent above the choice "B" loan level.

PRICES OF COMMERCIALLY AVAILABLE SYNTHETIC RUBBER

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900 [1]
Butaprene NH	.6500 [1]
Butaprene NL	.5000 [1]
Butaprene NXM	.5800 [1]
Chemigum N1	.6400 [3]
Chemigum N3	.5800 [3]
Chemigum N5	.5800 [3]
Chemigum N6	.5000 [3]
Chemigum N6B	.5000 [3]
Chemigum N7	.5000 [3]
Chemigum N8	.5000 [3]
Herecol N-33	.6800 [3]
Hycar 1001	.5800 [3]
Hycar 1002	.5000 [3]
Hycar 1014	.6000 [3]
Hycar 1041	.5800 [3]
Hycar 1042 and 1043	.5000 [3]
Hycar 1312	.5000 [3]
Hycar 1411	.6200 [3]
Hycar 1432	.5900 [3]
Hycar 1441	.6200 [3]
Paracril AJ	.4850 [3]
Paracril B	.5000 [2]
Paracril BJ	.5000 [3]
Paracril BLT	.5000 [2]
Paracril C	.5800 [3]
Paracril CV	.5900 [2]
Paracril D	.6500 [2]
Paracril 18-80	.6000 [3]
Polysar Krynac 800	.5000 [3]
Polysar Krynac 801	.5800 [3]
Polysar Krynac 802	.5000 [3]
Polysar Krynac 803	.5000 [3]

Butadiene-Styrene Types

Ameripol 1000	.2410 [3]
Ameripol 1001	.2410 [3]
Ameripol 1002	.2435 [3]
Ameripol 1006	.2410 [3]
Ameripol 1006 (crumb)	.2475 [3]
Ameripol 1007	.2410 [3]
Ameripol 1009	.2475 [3]
Ameripol 1011	.2550 [3]
Ameripol 1012	.2425 [3]
Ameripol 1012 (crumb)	.2540 [3]
Ameripol 1013	.2500 [3]
Ameripol 1500	.2410 [3]
Ameripol 1501	.2410 [3]
Ameripol 1502	.2410 [3]
Ameripol 1703	.2060 [3]
Ameripol 1705	.2035 [3]
Ameripol 1707	.1910 [3]
Ameripol 1708	.1910 [3]
Ameripol 1710	.1885 [3]
Ameripol 1712	.1885 [3]
Ameripol 4700	.1750 [3]
Ameripol 4701	.1725 [3]
ASRC 1000	.2410 [3]
ASRC 1001	.2401 [3]
ASRC 1004	.2401 [3]
ASRC 1006	.2410 [3]
ASRC 1009	.2475 [3]
ASRC 1018	.2700 [3]
ASRC 1019	.2650 [3]
ASRC 1500	.2410 [3]
ASRC 1502	.2410 [3]
ASRC 1503	.2625 [3]
ASRC 1703	.2060 [3]
ASRC 1708	.1910 [3]
ASCR 3110	.2600 [3]
Baytown 1600	.1760 [2]
Baytown 1601	.1760 [2]
Baytown 1602	.1760 [2]
Baytown 1801	.1600 [2]
Carbomix 3750	.1820 [3]
Carbomix 3751	.1545 [3]
Copo 1500	.2410 [3]
Copo 1502	.2410 [3]
Copo 1505	.2610 [3]
Copo 1712	.1885 [3]
Copo 1773	.2060 [3]
Copo 1778	.1910 [3]
Copo 3900	.2310 [3]
FR-S 1000	.2410 [3]
FR-S 1001	.2410 [3]
FR-S 1004	.2410 [3]
FR-S 1006	.2410 [3]
FR-S 1009	.2475 [3]
FR-S 1010	.2600 [3]
FR-S 1012	.2425 [3]
FR-S 1013	.2500 [3]
FR-S 1014	.2810 [3]
FR-S 1015	.2910 [3]
FR-S 1500	.2410 [3]
FR-S 1502	.2410 [3]
FR-S 1703	.2060 [3]
FR-S 1705	.2035 [3]
FR-S 1712	.1885 [3]
Naugapol 1016	.2650 [3]
Naugapol 1018	.2700 [3]
Naugapol 1019	.2650 [3]
Naugapol 1021	.3000 [3]
Naugapol 1022	.2800 [3]
Naugapol 1023	.2850 [3]
Naugapol 1503	.2625 [3]
Naugapol 1504	.2950 [3]
Philprene 1000	.2410 [1]
Philprene 1001	.2410 [1]
Philprene 1006	.2410 [1]
Philprene 1009	.2475 [1]
Philprene 1010	.2600 [1]
Philprene 1018	.2700 [1]
Philprene 1019	.2650 [1]
Philprene 1100	.1940 [1]
Philprene 1104	.1900 [1]
Philprene 1500	.2410 [1]
Philprene 1502	.2410 [1]
Philprene 1503	.2625 [1]
Philprene 1600	.1930 [1]
Philprene 1601	.1930 [1]
Philprene 1605	.1900 [1]
Philprene 1703	.2060 [1]
Philprene 1706	.2030 [1]
Philprene 1708	.1910 [1]
Philprene 1712	.1885 [1]
Philprene 1803	.1740 [1]
Plioflex 1006	.2410 [3]
Plioflex 1500	.2410 [3]
Plioflex 1502	.2410 [3]
Plioflex 1703	.2060 [3]
Plioflex 1710	.1885 [3]
Plioflex 1712	.1885 [3]
Plioflex 1773	.2060 [3]
Plioflex 1778	.1910 [3]
Polysar Kryflex 200	.2510 [3]
Polysar Krylene	.2410 [3]
Polysar Krylene NS	.2410 [3]
Polysar Krynol 651	.1885 [3]
Polysar Krynol 652	.1910 [3]
Polysar S	.2410 [3]
Polysar S-50	.2410 [3]
Polysar S-X 371	.2550 [3]
Polysar SS-250	.2875 [3]
S-1000	.2300 [2]
S-1002	.2325 [2]
S-1006	.2300 [2]
S-1009	.2400 [2]
S-1011	.2325 [2]
S-1013	.2300 [2]
S-1100	.1850 [2]
S-1500	.2300 [2]
S-1502	.2300 [2]
S-1506	.2500 [2]
S-1600	.1825 [2]
S-1602	.1825 [2]
S-1703	.1950 [2]
S-1706	.1925 [2]
S-1707	.1800 [2]
S-1709	.1775 [2]
S-1712	.1775 [2]
S-1803	.1650 [2]
S-1804	.1750 [2]
Synpol 1000	.2410 [1]
Synpol 1001	.2410 [1]
Synpol 1002	.2435 [1]
Synpol 1006	.2410 [1]
Synpol 1007	.2410 [1]
Synpol 1009	.2475 [1]
Synpol 1012	.2425 [1]
Synpol 1013	.2500 [1]
Synpol 1061	.2410 [1]
Synpol 1500	.2410 [1]
Synpol 1502	.2410 [1]
Synpol 1551	.2410 [1]
Synpol 1703	.2060 [1]
Synpol 1707	.1910 [1]
Synpol 1708	.1910 [1]
Synpol 1711	.1900 [1]
Synpol 1712	.1885 [1]

Butyl Rubbers

Enjay Butyl 035 and 150	.2300 [2]
Enjay Butyl 165 NS	.2400 [2]
Enjay Butyl 215	.2300 [2]
Enjay Butyl 217	.2300 [2]
Enjay Butyl 218	.2300 [2]
Enjay Butyl 268 NS	.2400 [2]
Enjay Butyl 325	.2300 [2]
Enjay Butyl 365 NS	.2400 [2]
Polysar Butyl 100	.2450 [3]
Polysar Butyl 101	.2775 [3]
Polysar Butyl 200 and 300	.2450 [3]
Polysar Butyl 301	.2550 [3]
Polysar Butyl 400	.2450 [3]

Chlorosulfonated Polyethylene

Hypalon 20	.7000 [2]
Hypalon 30	.7000 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [2]
Neoprene Type AD	.5500 [2]
Neoprene Type FB	.6500 [2]
Neoprene Type GN	.4100 [2]
Neoprene Type GN-A	.4100 [2]
Neoprene Type GRT	.4200 [2]
Neoprene Type KNR	.7500 [3]
Neoprene Type S	.4200 [2]
Neoprene Type W	.3900 [2]
Neoprene Type WB	.4100 [2]
Neoprene Type WHV	.3900 [2]
Neoprene Type WRT	.4500 [2]
Neoprene Type WX	.4100 [2]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.5000 [2]
Thiokol Type FA	.6900 [2]
Thiokol Type ST	1.2500 [2]

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50 [3]
GE Silicone Gum (not compounded)	4.00 [3]
Silastic (compounded)	1.90 [3]
Silastic (gums)	3.85 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400	.5400 [1]
Butaprene N-401	.5400 [1]
Chemigum 200	.4900 [3]
Chemigum 235	.5400 [3]
Chemigum 236	.5400 [3]
Chemigum 245	.4600 [3]
Chemigum 246	.4600 [3]
Chemigum 247	.4600 [3]
Chemigum 248	.4600 [3]
Hycar 1512	.4600 [3]
Hycar 1551	.5400 [3]
Hycar 1552	.4600 [3]
Hycar 1561	.5400 [3]
Hycar 1562	.4600 [3]
Hycar 1571	.5400 [3]
Hycar 1572	.5100 [3]
Hycar 1577	.4600 [3]
Hycar 1852	.4600 [3]
Nitrex 2612	.4600 [1]
Nitrex 2614	.4600 [1]
Nitrex 2614-A	.4600 [1]
Nitrex 2515	.5100 [1]
Nitrex 2615-A	.5100 [1]
Nitrex 2616	.5400 [1]
Nitrex 2617	.4600 [1]
Nitrex 2617-A	.4600 [1]
Nitrex 2619	.5300 [1]
Nitrex 2620	.4600 [1]
Nitrex 2625	.4600 [1]

Butadiene-Styrene Types

Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3375 [3]
Copo 2110	.3200 [3]
Copo X-800	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]

POLYMERS

FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000	.2775 [1]
Naugatex 2001	.2775 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105	.3200 [1]
Naugatex 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Pliolite 2000	.2775 [3]
Pliolite 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite 2107	.3200 [3]
Pliolite 2108	.3000 [3]
S-2000	.2275 [2]
S-2006	.2150 [2]
S-2101	.2250 [2]
S-2105	.3100 [2]
S-2107	.3200 [2]

Neoprene

Neoprene Latex 60	.4000 [2]
Neoprene Latex 571	.3700 [2]
Neoprene Latex 572	.3900 [2]
Neoprene Latex 601-A	.4000 [2]
Neoprene Latex 673	.5000 [2]
Neoprene Latex 735	.3800 [2]
Neoprene Latex 736	.3800 [2]
Neoprene Latex 842-A	.3700 [2]
Neoprene Latex 950	.4700 [2]

Polysulfide Rubbers

Thiokol Type MX	.8000 [2]
Thiokol Type WD-2	1.2500 [2]
Thiokol Type WD-6	.8000 [2]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

SUPPLIERS

Are Your

Synthetic Rubbers

Listed

in This Section?

if not

Forward full information

to

Market Editor

RUBBER AGE

101 West 31st St.,

New York 1, N. Y.

DAY

DUST CONTROL NEWS

Two DAY "AC" Dust Filters (left and center of photo) and DAY bag trap (at right) located on roof of rubber company plant. Empty carbon black bags are carried from work area to bag trap through same piping system used to control dust in work area. This eliminates bag disposal problems, speeds production.

Capture and Restore Carbon Black Dust Losses Automatically

DAY "AC"* Reverse Jet dust filters are favorites with rubber companies because they effectively control dust from Banbury mixers and return captured dust to the *same* mixture from which it escaped. This rapid return of dust means better control of weighed ingredients. It also eliminates adding extra materials to take care of "invisible" dust losses. This automatic and continuous return of ingredients improves mixture uniformity and batch quality.

The majority of DAY filters are installed *inside* rubber company plants. DAY filters are so highly efficient the clean air from the filter can be returned back to work areas. During the winter time this saves considerable heat loss. In summer the air from the filter can be exhausted outdoors to help keep the plant cooler. DAY dust control improves product quality and helps increase production for rubber companies. It is your best dust control buy. **For the latest information about DAY services and "AC" dust filters write toDAY for your copy of Bulletin F-75.**

*Licensed by H. J. Hersey, Jr.

The **DAY** *Company*

SOLD in UNITED STATES by
The DAY SALES Company
803 Third Ave. N.E., Minneapolis 13, Minn.

MADE and SOLD in CANADA by
The DAY Company of Canada Limited
11 Brydon Drive, Rexdale (Toronto), Ontario

Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,115	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,343
1955	635,174	634,800	10,611	110,105
1956	580,510	563,095	11,300	115,949
1957	499,121	539,761	10,146	100,901
1957:				
June	30,290	41,282	859	90,694
July	44,760	39,789	483	98,871
Aug.	48,951	44,932	1,000	99,093
Sept.	44,188	43,675	780	103,233
Oct.	49,371	48,782	926	102,496
Nov.	44,583	43,696	1,225	97,754
Dec.	44,544	38,058	1,000	100,473
1958:				
Jan.	45,564	42,597	706	104,979
Feb.	52,546	36,711	903	110,880
Mar.	41,986	38,191	1,150	112,863
Apr.	31,511	36,608	1,395	107,897
May	29,237	36,014	1,707	100,985
June	28,902	37,607	1,000	91,779

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1936	467,064	152,072,496	19,852	6,659,899	486,916
1937	574,600	237,307,041	23,185	10,213,670	597,785
1938	397,640	145,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1955	542,507	360,435,303	92,825	80,163,114	635,332
1956	499,479	334,990,045	71,709	61,795,844	564,321
1957	475,958	291,337,628	78,567	58,249,788	554,174
1957:					
June	25,481	15,262,392	4,810	3,605,798	30,291
July	38,517	23,567,902	6,243	4,721,139	44,760
Aug.	42,117	25,931,151	6,834	4,900,028	48,951
Sept.	38,672	24,073,879	5,516	4,266,918	44,188
Oct.	41,020	25,996,607	8,351	6,120,335	49,020
Nov.	38,087	22,885,060	6,496	4,688,156	44,583
Dec.	46,350	26,243,338	7,572	5,141,999	53,922
1958:					
Jan.	39,275	20,938,606	6,290	4,210,554	45,565
Feb.	39,005	20,299,708	7,013	4,787,054	46,018
Mar.	32,740	16,891,665	7,147	4,736,971	39,887

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America*	Rest of World*	Total*
1945	8,600*	10,000*	97,500	12,000*	47,125	73,570	250,000
1946	403,719	175,000*	94,000	19,975	39,678	105,080	837,500
1947	646,362	277,951	89,000	38,128	34,928	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318	225,659	1,490,000
1950	694,090	696,472	113,500	48,482	26,902	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000	344,584	1,897,500
1956	568,550	686,667	95,389	89,072	22,457	336,015	1,857,000
1957	638,706	684,515	98,164	58,440	28,351	381,824	1,890,000
1958:							
Jan.	61,215	33,997	9,853	5,786	3,708	32,941	147,500
Feb.	51,633	28,717	6,585	1,927	500	30,638	120,000
Mar.	48,663	47,279	6,938	1,740	500	37,380	142,500
Apr.	44,962	40,775	9,763	4,094	500	29,906	130,000
May	45,398	37,779	8,516	....	500	35,307	127,500

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1944	710,783	86,977	34,310	132,500	160,690	1,125,000
1945	799,009	91,047	41,836	87,500	108,164	1,127,500
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	630,000	464,250	2,980,000
1956	1,436,482	232,345	91,458	775,500	489,215	3,025,000
1957	1,464,640	239,021	88,379	777,250	565,710	3,135,000
1958:						
Jan.	115,222	20,483	6,202	74,000	39,093	255,000
Feb.	100,941	21,293	5,979	78,500	40,787	247,500
Mar.	104,231	23,481	5,907	74,750	49,131	257,500
Apr.	103,221	18,071	6,439	.....	132,269	260,000
May	102,318	20,165	6,836	....	115,681	245,000

Source: International Rubber Study Group. * Estimated.

Rim Production

	1953	1954	1955	1956	1957
Passenger Car	31,318,461	25,952,322	38,092,080	27,109,610	27,301,567
Truck & Bus	5,228,831	4,463,689	6,642,329	6,315,428	5,468,223
Agricultural	1,943,489	1,279,040	1,931,768	1,416,938	1,368,127
Earth Mover	24,685	21,536	38,849	88,812	67,289
Total	38,514,954	31,734,587	46,705,036	34,930,788	34,205,206

	1958					
	Feb.	Mar.	Apr.	May	June	July
Passenger Car	1,578,212	1,599,812	1,711,921	1,438,950	1,431,337	1,306,266
Truck & Bus	291,400	246,742	302,314	320,070	318,248	318,952
Agricultural	142,643	136,914	105,495	66,787	65,173	76,525
Earth Mover	4,817	3,188	4,933	2,507	8,049	2,137
	2,017,072	1,986,657	2,124,663	1,828,269	1,822,807	1,703,880

Source: The Tire & Rim Association, Inc.

More Worlds to Conquer

It was the speedy chariot which swept the field when Alexander of Macedon defeated the last army the Persians were able to muster, at the battle of Arbela in 331 B.C. And the 25-year-old leader of the Macedonians later wept for more worlds to conquer.

In ancient times, chariots were an important part of a nation's battle array. The Romans also used them for sport and display, and beautifully designed chariots carried conquering heroes through the streets of the Eternal City.

As civilization expanded — and there were more worlds to conquer — the wheels turned, bringing prosperity and well-being to nations and to people. The vast distances of Alexander's world were linked together by the wheel for quicker movement of people and their products.

In mid-20th century, the world, in another sense, is being conquered by the rubber tire, reinforced by carbon black. Now man easily and quickly transports himself and his products over great reaches, and, in turn, can have the world brought to his own doorstep.

UNITED CARBON COMPANY, INC.

What's that — no problems or complaints on Kosmos 60 HAF black? That's right!

You have no problems when Kosmos 60 is your standard because it is a super quality black made from specially selected feedstocks by a well-proven process. To be sure, the black is control checked at all times.

You'll have no doubts about Kosmos 60 quality because the black is exceptionally well designed to process to your liking and to reinforce as an accepted HAF black should.

There should be no occasion for complaints on Kosmos 60: the black is of high quality to begin with and is extremely uniform. It also contributes to the best service performance no matter how severe the conditions.

Standardize on UNITED blacks. They have what it takes to put your products across.

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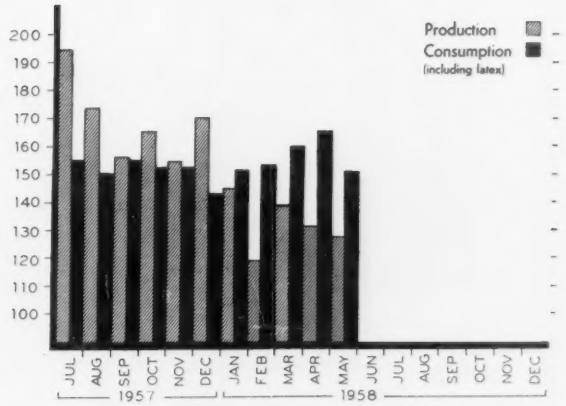
BOSTON LOS ANGELES MEMPHIS

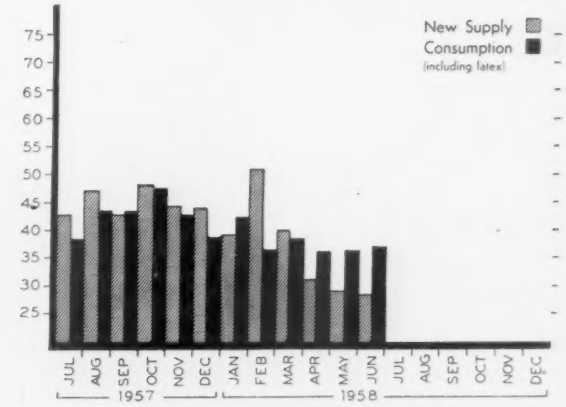
IN CANADA: CANADIAN INDUSTRIES LIMITED

STATISTICS at a glance

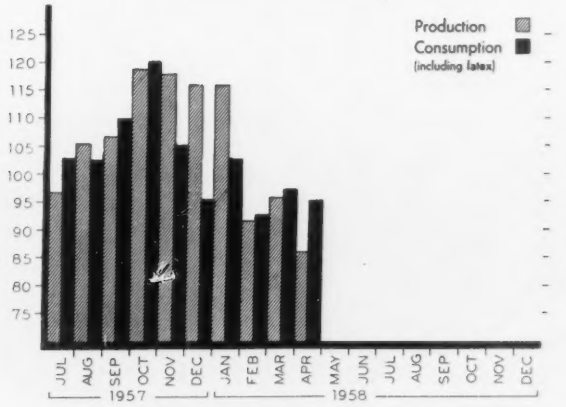
NATURAL RUBBER—WORLD
(thousands of long tons)



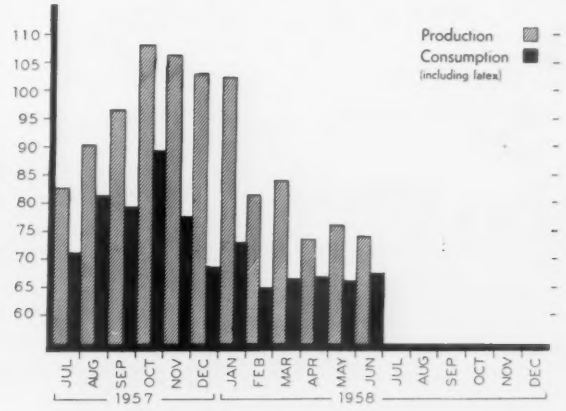
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



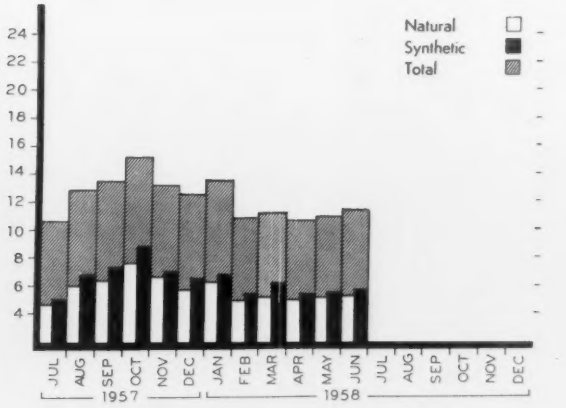
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



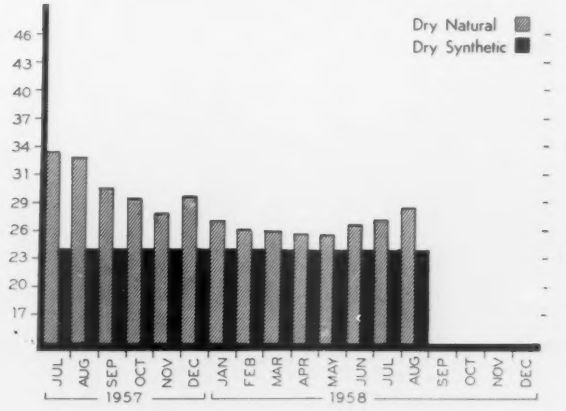
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1949	**310,539**	**35,215**	**54,046**	**11,072**	**410,932**
1950	**378,887**	**50,067**	**60,915**	**12,037**	**501,906**
1951	**704,529**	**58,907**	**76,475**	**15,333**	**855,244**
1952	**654,854**	**65,745**	**81,630**	**16,228**	**818,447**
1953	**680,728**	**80,495**	**79,801**	**20,198**	**861,222**
1954	**490,405**	**69,150**	**58,802**	**21,396**	**639,753**
1955	801,145	91,357	56,179	32,623	982,304
1956	876,982	99,412	75,873	34,547	1,086,814
1957	913,321	110,721	67,418	33,618	1,125,078
1957:					
Oct.	88,400	9,545	6,085	4,002	108,289
Nov.	87,577	9,976	6,099	2,860	106,512
Dec.	85,624	9,568	6,469	2,519	104,180
1958:					
Jan.	85,828	8,804	6,189	2,419	103,240
Febr	66,402	8,200	4,996	2,157	81,755
Mar.	69,230	7,671	4,698	2,042	83,641
Apr.	59,263	7,973	4,324	2,197	73,757
May	62,161	7,450	4,462	2,338	76,411
June	62,567	7,251	1,926	2,306	74,050

Consumption

1950	**416,230**	**43,781**	**66,348**	**11,930**	**538,289**
1951	**626,444**	**48,887**	**70,500**	**13,066**	**758,897**
1952	**666,420**	**55,522**	**71,229**	**13,866**	**807,037**
1953	**624,181**	**65,900**	**77,826**	**16,929**	**784,836**
1954	**500,345**	**57,203**	**61,464**	**17,715**	**636,727**
1955	741,997	72,876	53,991	26,035	894,899
1956	727,789	74,887	49,615	24,976	877,267
1957	767,218	75,461	55,413	25,187	923,279
1957:					
Nov.	62,148	6,136	4,521	2,110	74,915
Dec.	55,994	5,464	3,930	1,811	67,199
1958:					
Jan.	60,179	5,928	4,508	2,010	72,625
Feb.	52,962	5,045	4,255	1,968	64,230
Mar.	54,816	4,965	4,297	1,962	66,040
Apr.	55,133	4,962	4,621	1,897	66,613
May	55,463	4,805	4,258	1,778	66,304
June	58,507	4,844	4,402	2,053	69,806

Exports

1950	**900**	**4,826**	**31**	**1,895**	**7,652**
1951	**483**	**6,825**	**216**	**1,725**	**9,249**
1952	**9,467**	**9,813**	**126**	**2,695**	**22,101**
1953	**7,692**	**11,494**	**237**	**3,245**	**22,668**
1954	**11,069**	**12,062**	**2,831**	**4,155**	**30,117**
1955	60,704	18,098	9,895	4,593	93,290
1956	112,366	21,909	8,699	6,194	149,168
1957	157,977	30,242	8,748	6,377	203,344
1957:					
Sept.	11,625	1,964	540	396	14,525
Oct.	12,200	2,588	1,261	467	16,516
Nov.	12,639	2,521	809	410	16,379
Dec.	15,549	2,447	814	563	19,373
1958:					
Jan.	14,109	2,649	1,626	513	18,897
Feb.	9,947	2,626	1,415	378	14,366
Mar.	15,647	2,356	757	410	19,170
Apr.	11,583	2,899	949	698	16,129
May	14,067	....	1,218	784	16,069

Stocks

1949	**77,731**	**4,654**	**12,224**	**3,433**	**98,042**
1950	**36,942**	**5,733**	**7,243**	**2,840**	**52,758**
1951	**105,271**	**8,379**	**12,481**	**3,821**	**129,912**
1952	**83,861**	**8,535**	**22,716**	**3,875**	**118,987**
1953	**135,153**	**11,480**	**24,866**	**4,346**	**175,845**
1954	**115,499**	**11,349**	**19,267**	**4,280**	**150,395**
1955	**108,989**	**12,220**	**10,500**	**6,030**	**137,739**
1956	151,763	14,077	28,744	7,934	202,518
1957	140,199	18,843	31,489	7,454	197,985
1957:					
Nov.	124,432	16,453	29,702	7,380	177,967
Dec.	140,199	18,843	31,489	7,454	197,985
1958:					
Jan.	152,441	18,691	31,753	7,512	210,397
Feb.	151,501	18,409	31,369	7,635	208,914
Mar.	153,221	18,504	30,796	6,947	209,468
Apr.	143,981	18,764	30,012	6,469	199,226
May	137,277	19,014	29,246	6,392	191,929
June	132,800	18,763	25,954	6,231	183,721

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955	92,754	69,364	10,432	10,798	90,594	183,348
1956	72,013	69,720	10,642	10,650	91,012	163,025
1957	72,252	74,535	10,403	11,420	96,358	168,610
1957:						
July	6,243	4,646	572	844	6,062	12,305
Aug.	6,834	6,816	874	608	8,298	15,132
Sept.	5,516	5,649	917	1,285	7,851	13,367
Oct.	8,351	6,876	885	1,133	8,894	17,245
Nov.	6,496	6,515	1,021	994	8,530	15,026
Dec.	7,572	5,915	704	734	7,353	14,925
1958:						
Jan.	6,289	5,998	788	785	7,571	13,860
Feb.	7,013	3,852	765	671	5,288	12,301
Mar.	7,147	4,880	759	787	6,426	13,573
Apr.	4,750	3,889	907	830	5,626	10,376
May	4,833	3,635	808	882	5,325	10,158
June	4,047	4,539	696	890	6,125	10,172

Consumption[1]

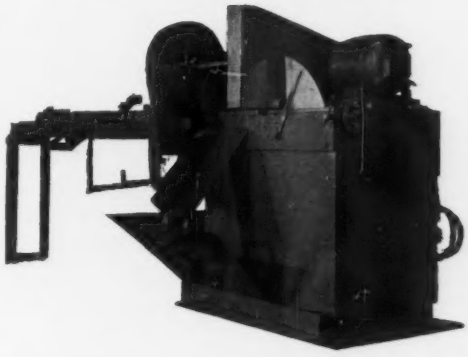
1945	**3,886**	**14,500**	**6,800**	....	**21,300**	**25,186**
1946	**5,714**	**23,500**	**13,000**	....	**36,500**	**42,214**
1947	**13,909**	**22,500**	**6,500**	....	**29,000**	**42,909**
1948	**28,489**	**21,500**	**5,250**	....	**26,750**	**55,239**
1949	**36,117**	**21,500**	**3,750**	....	**25,250**	**61,367**
1950	**56,138**	**31,000**	**5,500**	....	**36,500**	**92,638**
1951	**46,750**	**31,031**	**6,279**	**2,628**	**39,938**	**86,688**
1952	**53,567**	**40,562**	**7,368**	**3,093**	**51,023**	**104,590**
1953	**67,375**	**46,473**	**7,981**	**3,654**	**58,108**	**125,483**
1954	**75,931**	**44,173**	**7,251**	**4,507**	**55,931**	**131,862**
1955	86,478	63,982	8,736	8,495	81,213	167,691
1956	74,082	62,762	8,708	8,021	79,491	153,573
1957	75,009	68,305	9,039	8,630	85,974	160,983
1957:						
July	5,078	4,333	677	480	5,490	10,568
Aug.	6,372	5,843	784	823	7,450	13,822
Sept.	6,515	5,761	712	753	7,226	13,741
Oct.	7,108	6,654	788	857	8,299	15,407
Nov.	6,650	5,862	725	712	7,299	13,949
Dec.	5,816	5,338	651	606	6,595	12,411
1958:						
Jan.	6,380	5,438	806	683	6,927	13,307
Feb.	5,380	4,475	640	806	5,921	11,301
Mar.	5,560	4,708	633	720	6,061	11,621
Apr.	4,847	4,093	707	797	5,597	10,444
May	5,004	4,102	785	795	5,682	10,686
June	5,304	4,165	639	919	5,723	11,027

Stocks at End of Period

1945	**3,121**	....	....	....	....	**3,121**
1946	**4,865**	....	....	....	....	**4,865**
1947	**5,033**	....	....	....	....	**5,033**
1948	**11,235**	....	....	....	....	**11,235**
1949	**5,063**	....	....	....	....	**5,063**
1950	**4,927**	....	....	....	....	**4,927**
1951	**4,752**	**3,727**	**1,245**	**532**	**5,504**	**10,256**
1952	**6,201**	**5,040**	**1,019**	**902**	**6,961**	**13,162**
1953	**13,532**	**4,794**	**1,117**	**721**	**6,632**	**20,164**
1954	**11,133**	**5,134**	**1,087**	**811**	**7,032**	**18,165**
1955	13,203	6,980	1,236	1,807	10,203	23,406
1956	12,064	7,451	1,384	1,558	10,393	22,457
1957	14,454	8,347	1,267	1,974	11,588	26,042
1957:						
July	12,073	8,045	1,296	1,953	11,294	23,367
Aug.	13,535	7,997	1,309	1,545	10,851	24,386
Sept.	12,315	7,566	1,141	1,700	10,407	22,722
Oct.	12,399	7,254	1,142	1,723	10,119	22,518
Nov.	12,316	7,558	1,265	1,927	10,750	23,066
Dec.	14,454	8,662	1,267	1,974	11,903	26,357
1958:						
Jan.	14,178	8,222	1,190	2,052	11,464	25,642
Feb.	15,506	7,992	1,251	2,297	11,540	27,046
Mar.	16,825	7,991	1,281	1,974	11,246	28,071
Apr.	17,415	7,756	1,398	1,744	10,898	28,313
May	17,604	7,240	1,292	1,732	10,264	27,868
June	17,078	7,337	1,267	1,888	10,492	27,570

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

SLICER MACHINE
for
EXTRUDED STOCKS



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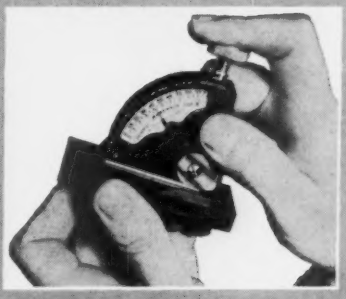

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Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1951 (total)	**32,153**	**44,612**	**1,677**	**78,442**	**83,405**	**8,765**
Passenger Car	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total)	**29,484**	**54,342**	**1,520**	**85,346**	**90,411**	**14,110**
Passenger Car	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	**37,949**	**55,124**	**1,543**	**94,617**	**96,150**	**15,720**
Passenger Car	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1954 (total)	**33,333**	**55,155**	**1,753**	**90,241**	**89,141**	**14,762**
Passenger Car	29,741	47,044	928	77,713	76,794	12,217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1955 (total)	**47,374**	**59,246**	**1,879**	**108,499**	**112,178**	**18,778**
Passenger Car	42,574	50,189	966	93,730	97,223	15,963
Truck and Bus	4,800	9,057	912	14,769	14,955	2,815
1956 (total)	**35,422**	**62,146**	**1,757**	**99,325**	**100,406**	**79,872**
Passenger Car	30,873	53,252	875	85,000	85,546	16,494
Truck and Bus	4,548	8,894	883	14,325	14,859	3,378
1957 (total)	**36,765**	**65,150**	**1,733**	**103,649**	**106,940**	**250,536**
Passenger Car	32,725	56,603	889	90,217	93,542	210,146
Truck and Bus	4,053	8,546	846	13,432	13,398	40,384
1957:						
June (total)	2,993	6,191	127	9,310	8,489	20,783
Passenger Car	2,623	5,476	63	8,162	7,462	17,322
Truck and Bus	370	715	64	1,148	1,027	3,461
July (total)	3,068	6,646	126	9,840	8,443	19,316
Passenger Car	2,719	5,826	65	8,611	7,449	16,097
Truck and Bus	349	819	61	1,229	994	3,219
Aug. (total)	3,214	6,488	130	9,833	8,917	18,477
Passenger Car	2,886	5,675	66	8,627	7,801	15,348
Truck and Bus	328	813	65	1,206	1,117	3,129
Sept. (total)	1,688	5,902	133	7,723	8,641	19,393
Passenger Car	1,398	5,096	70	6,564	7,535	16,310
Truck and Bus	290	805	63	1,159	1,105	3,083
Oct. (total)	2,620	5,351	182	8,154	9,708	20,985
Passenger Car	2,298	4,392	88	6,778	8,437	17,998
Truck and Bus	322	960	94	1,375	1,271	2,987
Nov. (total)	3,398	3,630	143	7,171	8,248	22,178
Passenger Car	3,098	3,049	74	6,220	7,098	18,960
Truck and Bus	301	581	70	951	1,150	3,211
Dec. (total)	3,070	3,342	148	6,559	7,615	23,225
Passenger Car	2,803	2,858	78	5,739	6,597	19,818
Truck and Bus	267	484	70	820	1,018	3,408
1958:						
Jan. (total)	2,653	5,511	107	8,271	7,814	22,769
Passenger Car	2,377	4,838	50	7,264	6,740	19,299
Truck and Bus	277	674	57	1,007	1,074	3,470
Feb. (total)	2,253	4,374	110	6,737	7,314	23,392
Passenger Car	1,998	3,777	57	5,833	6,320	19,820
Truck and Bus	254	598	52	904	994	3,572
Mar. (total)	2,114	5,334	95	7,543	7,573	23,446
Passenger Car	1,845	4,726	49	6,621	6,569	19,786
Truck and Bus	269	608	46	923	1,004	3,659
Apr. (total)	1,876	6,183	116	8,175	7,477	22,658
Passenger Car	1,594	5,517	61	7,173	6,522	19,051
Truck and Bus	282	666	55	1,002	955	3,607
May (total)	2,173	6,220	110	8,503	7,653	21,834
Passenger Car	1,874	5,593	56	7,523	6,715	18,263
Truck and Bus	299	626	54	980	938	3,571
June (total)	1,932	7,182	117	9,231	8,293	20,920
Passenger Car	1,667	6,387	63	8,117	7,306	17,465
Truck and Bus	265	794	54	1,113	988	3,456

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1938	2,000,985	485,852	2,486,837	1948	3,909,270	1,363,856	5,273,126
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1946	2,148,699	930,760	3,079,429	1956	5,816,109	1,100,417	6,916,526
1947	3,558,178	1,220,634	4,778,812	1957	6,113,344	1,097,006	7,210,350
1957:							
Jan.	628,045	91,117	719,162	July	484,718	96,048	580,766
Feb.	570,023	91,767	661,790	Aug.	521,282	90,152	611,434
Mar.	585,734	91,703	676,437	Sept.	318,279	63,131	381,410
Apr.	541,733	105,175	646,908	Oct.	291,064	88,879	379,943
May	537,112	102,312	639,424	Nov.	583,783	94,574	678,357
June	496,329	94,321	590,650	Dec.	555,242	87,327	642,569
1958:							
Jan.	478,416	79,777	558,193	July	.....	.....	.....
Feb.	396,221	71,056	467,277	Aug.	.....	.....	.....
Mar.	359,464	73,666	433,130	Sept.	.....	.....	.....
Apr.	322,482	73,886	396,368	Oct.	.....	.....	.....
May	352,076	75,283	427,359	Nov.	.....	.....	.....
June	342,228	70,760	412,988	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1946	**15,327**	**59,357**	**1,424**	**76,108**	**77,251**	**3,820**
1947	**25,046**	**46,560**	**2,483**	**74,088**	**79,181**	**8,059**
1948	**26,833**	**40,548**	**1,119**	**68,499**	**70,033**	**9,641**
1949	**31,521**	**31,450**	**887**	**63,858**	**65,114**	**10,657**
1950	**41,240**	**42,671**	**811**	**84,723**	**80,179**	**....**
1951	**32,151**	**32,284**	**1,071**	**65,507**	**67,249**	**10,094**
1952	**29,451**	**32,985**	**1,014**	**63,449**	**65,073**	**12,036**
1953	**37,957**	**36,072**	**878**	**74,907**	**74,425**	**11,874**
1954	**25,071**	**35,576**	**945**	**61,593**	**48,279**	**9,519**
1955	**5,001**	**33,387**	**1,001**	**39,389**	**35,900**	**6,833**
1956	3,100	32,358	1,040	36,498	34,405	6,109
1957	3,046	35,687	1,076	39,806	39,774	80,077
1957:						
Sept.	213	3,180	90	3,483	3,365	6,174
Oct.	242	2,809	121	3,172	3,764	6,909
Nov.	237	2,403	96	2,736	3,243	7,444
Dec.	225	2,392	101	2,717	2,778	7,671
1958:						
Jan.	232	4,005	72	4,309	3,344	6,700
Feb.	209	3,014	73	3,412	3,444	6,866
Mar.	209	3,481	74	3,764	3,685	7,066
Apr.	201	2,978	64	3,243	3,624	7,609
May	225	2,742	68	3,035	3,530	8,189
June	202	3,332	67	3,602	3,476	8,156

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins							All Other Vinyl Resins		
	Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	Adhesives	All Other Uses	Grand Total
1953	**63,691**	**62,385**	**129,215**	**52,353**	**22,152**	**22,823**	**27,790**	**22,411**	**77,478**	**480,299**
1954	**69,943**	**56,588**	**147,284**	**49,546**	**34,890**	**23,676**	**35,148**	**26,609**	**74,090**	**517,773**
1955	83,276	51,424	183,736	64,223	56,357	27,439	53,868	31,853	105,644	657,821
1956	78,063	55,598	206,726	62,931	65,384	28,522	71,859	36,565	115,151	720,799
1957	90,543	56,344	216,517	66,392	81,357	31,519	50.637	41,665	113,396	748,370
1957:										
May	7,641	3,765	18,218	4,628	7,519	3,227	4,388	3,404	10,371	63,161
June	7,098	3,861	17,195	4,688	6,245	2,362	3,791	4,467	9,851	59,558
July	6,342	4,362	14,340	5,371	6,030	2,755	2,872	3,236	7,976	53,284
Aug.	7,121	4,941	17,962	6,884	7,553	2,515	4,252	3,677	9,011	63,916
Sept.	9,406	4,987	18,653	6,542	7,156	2,363	4,189	3,191	8,771	65,258
Oct.	10,747	5,102	21,712	6,802	7,506	2,256	4,466	3,771	10,887	73,249
Nov.	5,569	5,142	16,940	6,151	6,224	1,916	6,211	3,197	9,265	60,615
Dec.	4,231	4,396	14,002	3,936	6,176	2,073	5,345	2,896	8,292	51,347
1958:										
Jan.	5,870	4,119	16,361	4,035	7,562	2,885	4,071	3,213	10,780	58,896
Feb.	5,902	4,412	13,907	4,468	7,964	2,250	3,369	3,484	9,193	54,949
Mar.	6,530	4,248	15,340	3,863	9,215	2,322	3,760	3,941	9,036	58,255
Apr.	5,424	4,643	15,705	3,881	9,079	2,056	5,287	4,087	9,696	59,858
May	5,534	5,331	15,958	4,769	10,347	2,518	5,519	3,675	9,149	64,800
June	5,986	5,716	16,205	5,462	9,117	2,518	4,020	3,932	9,399	62,355

Source: Chemical Division, U. S. Tariff Commission.

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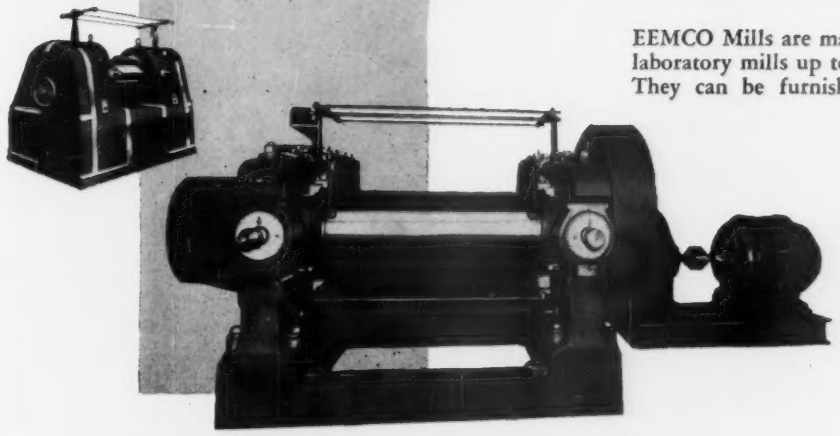

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Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1957 Production Workers (thousands)	1957 Average Weekly Earnings	1957 Average Weekly Hours	1957 Average Hourly Earnings	1958 Production Workers (thousands)	1958 Average Weekly Earnings	1958 Average Weekly Hours	1958 Average Hourly Earnings
Jan.	216.0	$91.21	40.9	$2.23	200.9	$87.48	38.2	$2.29
Feb.	212.6	90.80	40.9	2.22	191.3	85.04	37.3	2.28
Mar.	211.4	89.28	40.4	2.21	184.0	87.02	38.0	2.29
Apr.	191.3	87.60	40.0	2.19	176.0	85.88	37.5	2.29
May	204.2	88.80	40.0	2.22	172.5	87.86	38.2	2.30
June	196.8	91.21	40.9	2.23	177.0	....	...	...
July	199.8	94.16	41.3	2.28	....	....	...	...
Aug.	204.3	92.84	40.9	2.27	....	....	...	...
Sept.	206.4	92.97	40.6	2.29	....	....	...	...
Oct.	209.5	93.03	40.1	2.32	....	....	...	...
Nov.	209.0	93.20	40.0	2.33	....	....	...	...
Dec.	207.3	92.40	40.0	2.31	....	....	...	...

Tires and Tubes

Jan.	87.4	107.64	41.4	2.60	81.6	98.52	36.9	2.67
Feb.	86.8	106.19	41.0	2.59	78.5	93.02	35.1	2.65
Mar.	86.9	102.40	40.0	2.56	76.0	98.05	37.0	2.65
Apr.	71.1	103.46	40.1	2.58	72.1	95.67	36.1	2.65
May	84.9	103.46	40.1	2.58	70.7	99.86	37.4	2.67
June	78.2	107.23	41.4	2.59	....	....	...	...
July	83.9	112.20	42.5	2.64	....	....	...	...
Aug.	84.2	107.83	41.0	2.63	....	....	...	...
Sept.	84.4	107.20	40.3	2.66	....	....	...	...
Oct.	84.4	105.18	39.1	2.69	....	....	...	...
Nov.	84.0	106.62	39.2	2.72	....	....	...	...
Dec.	83.6	105.84	39.2	2.70	....	....	...	...

Rubber Footwear

Jan.	18.3	71.76	39.0	1.84	17.5	74.87	39.2	1.91
Feb.	17.8	72.10	39.4	1.83	17.0	74.68	39.1	1.91
Mar.	17.8	72.68	39.5	1.84	16.7	75.65	39.4	1.92
Apr.	17.5	70.64	38.6	1.83	16.5	75.46	39.3	1.92
May	17.3	71.92	39.3	1.83	16.3	75.85	39.3	1.93
June	17.4	72.29	39.5	1.83	....	....	...	...
July	16.8	72.13	39.2	1.84	....	....	...	...
Aug.	17.2	73.05	39.7	1.84	....	....	...	...
Sept.	17.6	74.45	39.6	1.88	....	....	...	...
Oct.	17.7	76.02	39.8	1.91	....	....	...	...
Nov.	18.0	78.96	40.7	1.94	....	....	...	...
Dec.	17.9	79.35	40.9	1.94	....	....	...	...

All Other Rubber Products

Jan.	110.3	81.39	40.9	1.99	101.8	80.94	39.1	2.07
Feb.	108.0	81.18	41.0	1.98	95.8	80.32	38.8	2.07
Mar.	106.7	81.19	40.8	1.99	91.3	79.87	38.4	2.08
Apr.	102.7	79.60	40.2	1.98	87.4	79.87	38.4	2.08
May	102.0	79.80	40.1	1.99	85.5	80.29	38.6	2.08
June	101.2	81.81	40.7	2.01	....	....	...	...
July	99.1	82.62	40.7	2.03	....	....	...	...
Aug.	102.9	83.84	41.1	2.04	....	....	...	...
Sept.	104.4	85.08	41.1	2.07	....	....	...	...
Oct.	107.4	86.10	41.0	2.10	....	....	...	...
Nov.	107.0	85.05	40.5	2.10	....	....	...	...
Dec.	105.8	84.03	40.4	2.08	....	....	...	...

Source: U. S. Department of Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1951	1952	1953	1954	1955	1956	1957	1958
Jan.	45.04	42.96	33.24	34.15	35.07	35.24	34.82	36.31
Feb.	(a)	41.64	33.76	35.00	35.04	36.26	34.82	35.83
Mar.	46.06	41.70	34.10	35.23	34.33	36.70	35.35	36.05
Apr.	46.60	41.79	33.85	35.22	34.23	36.81	35.43	36.00
May	46.06	39.98	34.30	35.34	34.80	36.65	35.40	36.27
June	46.06	41.31	34.11	35.17	34.83	36.67	35.45	36.33
July	46.21	40.37	34.20	35.37	34.61	35.43	35.49	36.51
Aug.	35.93	40.42	33.82	35.19	34.53	34.31	35.15	36.36
Sept.	36.20	39.75	33.69	35.46	33.85	34.35	34.74	....
Oct.	38.13	37.52	33.53	35.24	33.93	34.45	35.09	....
Nov.	42.70	35.59	33.60	34.80	34.87	34.56	36.06	....
Dec.	43.32	33.76	33.52	35.03	34.95	34.56	36.50	....
Average for Year	42.43	39.71	33.81	35.10	34.59	35.50	35.36	....

Note: The Government established a ceiling of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1947-1949 = 100)

(Based on man-hours)

	1956	1957	1958		1956	1957	1958
Jan.	147	145	116	July	125	136	...
Feb.	140	141	114	Aug.	135	141	...
Mar.	135	145	116	Sept.	132	138	...
Apr.	136	132	112	Oct.	134	135	...
May	127	134	113	Nov.	126	131	...
June	120	135	125	Dec.	137	117	...

Sales by the Rubber Industry

(in Millions of Dollars*)

	1956	1957	1958		1956	1957	1958
Jan.	415	496	448	July	459	514	...
Feb.	445	495	413	Aug.	436	514	...
Mar.	451	476	396	Sept.	429	481	...
Apr.	445	490	429	Oct.	454	490	...
May	464	481	428	Nov.	463	431	...
June	450	458	...	Dec.	461	427	...

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1956	1957	1958		1956	1957	1958
Jan.	935	1,047	1,100	July	987	1,045	...
Feb.	970	1,036	1,087	Aug.	1,007	1,074	...
Mar.	979	1,030	1,069	Sept.	1,007	1,074	...
Apr.	970	1,031	1,047	Oct.	1,002	1,097	...
May	985	1,024	1,020	Nov.	1,024	1,101	...
June	975	1,027	...	Dec.	998	1,092	...

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1916	102	55	72.50	1937	26⅞	14	19.39
1917	90	52	72.23	1938	17⅞	10¼	14.64
1918	70	40	60.15	1939	24	14⅛	17.57
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	22.40
1921	21¼	11½	16.36	1942	22½	22½	22.50
1922	28⅜	13⅜	17.50	1943	22½	22½	22.50
1923	37⅛	24¾	29.45	1944	22½	22½	22.50
1924	40⅜	17⅝	26.20	1945	22½	22½	22.50
1925	121	34⅜	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¼	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅝	4¼	6.17	1952*	33	26½	29.15
1932	4¾	2½	3.49	1953	31⅞	19⅛	24.21
1933	9⅞	2⅞	5.96	1954	34½	19½	23.61
1934	15⅞	8¾	12.92	1955	52	29⅜	39.16
1935	13¾	10½	12.37	1956	45	26½	34.24
1936	23	13½	16.41	1957	37⅜	26⅝	31.13

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1951	1952	1953	1954	1955	1956	1957	1958
Jan.	71.21	....	29.40	20.22	33.92	41.70	33.32	27.15
Feb.	73.61	....	27.57	19.98	34.90	33.68	30.43	26.32
Mar.	72.05	....	26.59	20.16	31.08	33.68	31.76	26.64
Apr.	....	....	24.66	22.06	31.75	31.74	32.23	26.44
May	....	....	25.52	21.96	31.35	29.61	32.12	25.51
June	....	....	24.42	23.01	34.74	30.54	32.80	26.20
July	....	30.52	23.64	24.12	40.84	33.91	32.88	27.70
Aug.	....	29.36	23.36	23.26	45.85	35.69	32.13	28.72
Sept.	....	27.42	23.06	23.99	48.27	32.64	29.94	....
Oct.	....	27.26	20.82	26.57	43.81	32.68	29.24	....
Nov.	....	29.25	20.58	28.07	44.95	35.18	27.47	....
Dec.	....	31.26	20.92	29.88	48.40	37.01	29.25	....
Average for Year	(a)	29.15	24.21	23.61	39.16	34.24	31.13	....

Note: (a) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

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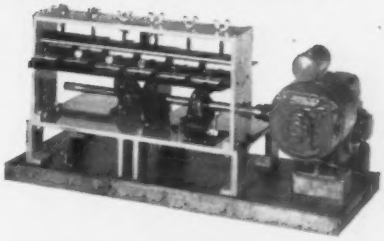

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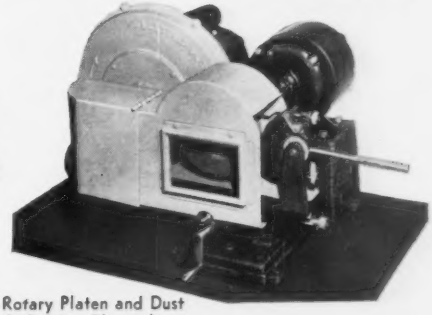

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Various Compounding Materials Consumed by the Rubber Industry

Material	1950	1951	1952	1953	1954	1955	1956
Antimony, Primary:							
Short tons	103[c]	19[c]	66[c]	20[c]	49[c]	78	56
% of total	.007	.001	.004	.001	.004	.006	.013
Asphalt:[a]							
Short tons	26,819	21,414	33,288	.....	.....	.....	.....
% of total	0.3	0.3	0.4	.....	.....	.....	.....
Barite (Barytes):							
Short tons	19,000	15,000	18,000	21,000	20,000	25,104	22,101
% of total	3.31	2.13	2.0	2.0	2.0	2.0	2.0
Carbon Black:							
Short tons	515,184	530,614	537,273	566,797	511,813	643,430	622,325
% of total	92.9	93.9	93.1	94.4	93.5	93.5	95.5
Clay, Kaolin:							
Short tons	263,306	231,331	240,982	241,052	247,431	257,223	268,157
% of total	15.0	12.7	13.2	12.8	13.2	11.9	12.0
Clay, Fire & Stoneware:							
Short tons	9,500	.....	9,322	18,475	8,781	2,928	.....
% of total	0.1	.....	0.1	.2	.1	.2	.....
Lime:							
Short tons	908	1,126	2,000	1,631	1,555	1,465	2,487
% of total	.0002	[d]	[d]	[d]	[d]	[d]	[d]
Litharge:							
Short tons	3,047	2,641	2,109	2,230	1,768	1,947	2,266
% of total	1.7	1.1	1.5	1.4	1.3	1.3	1.7
Lithopone:							
Short tons	4,092	3,295	1,523	1,723	1,701	2,163	2,000[e]
% of total	3.9	3.2	2.5	3.3	3.9	5.0	5.0
Mica, Ground:							
Short tons	5,776	6,551	5,126	5,668	5,021	7,339	7,021
% of total	8.0	9.0	7.0	7.8	6.3	6.9	8.0
Sulfur:							
Short tons	75,000	84,000	84,000	89,600	84,000	89,600	89,600
% of total	1.3	1.4	1.4	1.4	1.3	1.2	1.1
Talc:[b]							
Short tons	75,900	70,970	64,476	61,408	58,139	38,309	30,253
% of total	12.0	11.2	10.9	10.0	9.7	5.4	5.0
Zinc Oxide:							
Short tons	82,944	71,507	72,774	78,439	71,058	86,677	90,000[e]
% of total	51.6	48.4	51.2	52.7	50.7	51.5	52.0

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	New Supply	Consumption—Tons	Consumption—% to Crude[a]	Exports	Stocks On Hand at End of Period
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	26.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1955	326,649	312,781	20.4	13,988	31,498
1956	287,220	270,547	18.8	13,832	34,969
1957	271,647	267,352	18.2	13,021	29,323
1957:					
July	20,469	19,676	18.1	757	29,972
Aug.	20,432	22,429	18.1	917	28,521
Sept.	19,892	21,704	17.9	714	25,983
Oct.	26,419	24,925	18.1	1,230	27,171
Nov.	22,083	20,583	17.3	1,150	27,855
Dec.	20,101	18,263	17.2	843	29,323
1958:					
Jan.	21,172	21,186	18.4	892	29,569
Feb.	18,319	18,130	18.0	665	28,838
Mar.	19,601	19,300	18.5	1,012	28,984
Apr.	19,818	19,746	19.1	832	29,440
May	18,942	20,104	19.6	1,012	27,862
June	20,549	20,652	19.2	....	27,763

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Production—Rayon Tire Cord Not Woven	Production—Rayon Tire Cord Woven	Production—Cotton and Nylon Cord & Fabric[a]	Production—Chafer Fabrics (all fibers)	Production—Total Tire Cord and Fabric	Stocks[b]—Cotton and Nylon Cord & Fabric	Stocks[b]—Rayon Cord and Fabric
1957:							
Jan.-Mar.	21,853	68,825	31,393	11,028	123,182	11,844	37,153
Apr.-June	16,037	63,195	35,308	10,456	115,418	13,428	13,473
July-Sept.	10,509	54,968	33,477	9,147	100,091	13,305	36,388
Oct.-Dec.	9,216	58,392	32,827	10,176	101,687	14,909	29,632
Total	57,615	245,380	133,005	40,807	440,378	53,486	116,646
1958:							
Jan.-Mar.	8,372	56,522	25,647	7,367	92,924	11,255	33,913
Apr.-June	.....	.....	30,745	6,020	80,533	11,274	26,327
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1952	1953	1954	1955	1956	1957	1958
Jan.	86,863	89,634	89,852	96,397	100,642	109,295	107,281
Feb.	82,043	86,458	86,206	88,464	98,088	96,694	95,516
Mar.	87,065	98,158	101,549	105,684	112,412	113,166	108,914
Apr.	98,563	102,044	103,866	111,116	113,034	115,820	118,477
May	101,137	105,918	104,418	115,707	123,560	124,325	124,606
June	99,305	114,703	113,037	120,710	126,838	121,598	.....
July	105,307	112,969	112,231	115,653	120,708	130,251	.....
Aug.	102,954	109,124	110,223	121,816	125,847	128,808	.....
Sept.	100,095	106,158	104,706	113,379	111,574	113,567	.....
Oct.	103,689	106,037	105,607	112,558	119,204	119,334	.....
Nov.	91,326	99,210	102,393	109,212	112,113	107,705	.....
Dec.	95,817	100,225	104,258	111,034	108,096	112,691	.....
Total	1,154,254	1,230,629	1,238,346	1,321,730	1,372,116	1,393,254	.....

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

Year	Balata—Tons	Balata—Value	Jelutong—Tons	Jelutong—Value	Gutta-Percha & Other Guttas—Tons	Gutta-Percha & Other Guttas—Value
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1954	949	504,065	2,196	2,624,926	417	511,055
1955	1,022	967,369	1,679	1,731,821	284	318,115
1956	1,396	1,111,165	1,851	1,909,447	290	309,615
1957	1,037	670,821	1,680	1,942,067	230	270,487
1957:						
Aug.	19	10,245	126	138,622	7	5,544
Sept.	164	119,808	110	145,817	16	16,422
Oct.	97	68,547	166	207,038	5	9,259
Nov.	110	85,126	117	136,806	2	13,797
Dec.	71	55,902	136	144,229	....	.....
1958:						
Jan.	10	9,732	122	132,581	6	12,975
Feb.	4	3,390	46	45,507	7	19,454
Mar.	33	21,631	98	98,250	8	13,126

Source: U. S. Department of Commerce.

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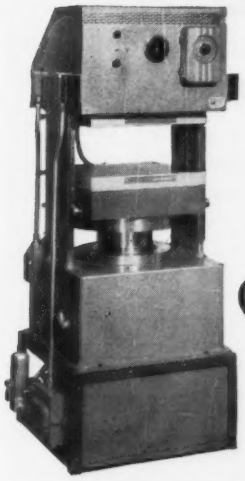

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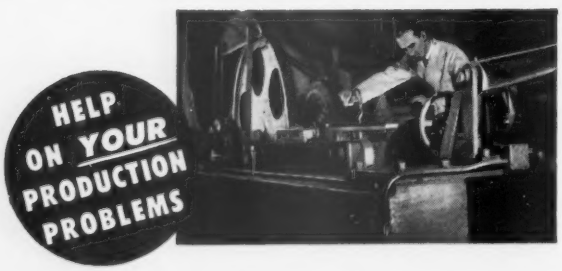

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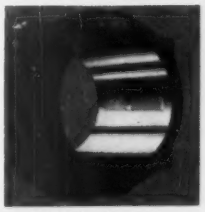

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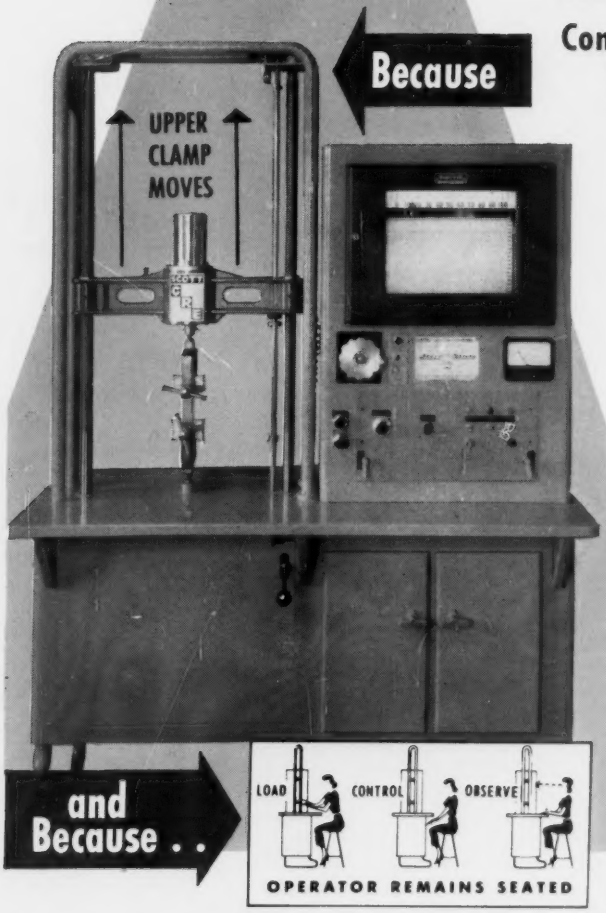

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